



INTERNATIONAL  
TECHNOLOGICAL  
UNIVERSITY



**2020 - 2021**

**University Catalog**

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This publication is an announcement of the current policies at International Technological University (ITU).

ITU makes every effort to ensure accuracy of the information contained in this catalog. Some policies, rules, procedures, and regulations may change and therefore, alter the information during this catalog period. The University reserves the right to change policies, regulations, fees, and course of instruction upon direction of the ITU Administration.

#### **ACCREDITATION**

International Technological University is accredited by the WASC Senior College and University Commission (WSCUC), 985 Atlantic Avenue, Suite 100, Alameda, CA 94501; (510) 748-9001. Questions regarding the University's accreditation may be directed to the institution or to WASC at:

[www.wascseior.org/contact](http://www.wascseior.org/contact) or (510) 748-9001. International Technological University (ITU) is a private institution. The University has received approval to operate from the Bureau for Private Postsecondary Education ([www.bppe.ca.gov](http://www.bppe.ca.gov)). An approval to operate means compliance with state standards as set forth in the California Education Code, Title 3, Division 10, Part 59, Chapter 8.

#### **GENERAL INFORMATION FOR PROSPECTIVE STUDENTS**

Prospective students are encouraged to review this catalog prior to signing an enrollment agreement. They are also encouraged to review the School Performance Fact Sheet, which must be provided to a student prior to signing an enrollment agreement.

#### **COMPLAINTS**

Students or any member of the public may file a complaint about this institution with the Bureau for Private Postsecondary Education by calling (888) 370-7589, or by completing a complaint form, which can be obtained on the bureau's Internet website at [www.bppe.ca.gov](http://www.bppe.ca.gov).

#### **ADDITIONAL QUESTIONS**

Any additional questions and/or concerns please contact the school at our mailing address at 2010 EL Camino Real, #852, Santa Clara, CA 95050, [info@itu.edu](mailto:info@itu.edu), or by calling (888) 488-4968. Any questions a student may have regarding this catalog that have not been satisfactorily answered by the institution may be directed to the Bureau for Private Postsecondary Education at:

**Physical Address:**  
2535 Capitol Oaks Drive, Suite 400,  
Sacramento, CA 95833

**Mailing Address:**  
P.O. Box 980818, West Sacramento, CA 95798

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(916) 431 - 6959  
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(888) 370 - 7589  
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(916) 263 - 1897

## **FROM THE OFFICE OF THE UNIVERSITY PRESIDENT**

Dear ITU Student,

On behalf of my wonderful late father -- Dr. Shu-Park Chan -- Founder of International Technological University (ITU) and our incredible faculty, staff, and alumni: welcome to the new 2020 year at ITU! We are proud to be your university of choice, and we hope, plan and expect for you to have a successful year, followed by an outstanding career, and to forever be affiliated and benefit from ITU!

In this catalog, you will find a wealth of information about ITU's academic programs, services, procedures, and regulations to help you succeed. ITU's vision is to empower you with innovative, industry-linked training that is hot in the market today. How do we do this?

The vast majority of ITU Faculty are "Director" level (or above) working professionals, managing team(s) of engineers in top firms (e.g. Google, Nvidia, Apple, Intel, NASA, Cadence, Facebook, Twitter, SpaceX, etc.) in the Silicon Valley, that regularly create new trends for the rest of the world to follow. So by ITU's design, you are learning the most current skills practiced in the Silicon Valley workplace, so that you will be hired quickly once you graduate from your studies at ITU.

This year ITU celebrates 26 years of educational excellence, which has resulted in a long history of outstanding student and alumni achievement. The year ahead promises positive developments at ITU for our students, alumni and the broader community we serve.

ITU's accreditation (attained from WASC Senior College and University Commission since 2013) most recently had a 4-member Panel Visit in January 2020, in which WASC reaffirmed ITU's excellence by commending ITU's education to be "highly relevant to Silicon Valley employers", an accolade which any university in the world would be overjoyed to get from their accrediting body.

Along with the independent attainment of the prestigious ACBSP accreditation in ITU's business program, recognition of ITU's educational excellence echoes throughout all of our programs and the regulatory bodies with which we choose to affiliate ourselves. But even more important to the leadership at ITU, the Silicon Valley hi-tech industry loves our graduates as witnessed by our placement rate which can exceed 90% at the end of any particular term. This is a placement rate far outpacing even the likes of our most prestigious neighboring institutional colleagues like Stanford, Berkeley, Santa Clara, and San Jose State University.

ITU's most recent curriculum updates include areas such as Ethical Hacking and Defense Using Python, Cybersecurity Protocols for the Web (an estimated 3.5 million skilled workers needed within the next calendar year which cannot be filled), Blockchain Fintech Verification Methods, AI Implementation Tools of Tensorflow and Pytorch, Deep Learning, Machine Learning, and Advanced Algorithm Design keeps ITU students current with the latest emergent technologies practiced in Silicon Valley's hi-tech companies. In addition to your studies, ITU offers a variety of cultural and social activities, including field trips (to NASA, Google, Facebook, Linked-In, Nvidia, Intel, SLAC, Acorn Campus, etc.) mixers, lectures at ITU Presents (ITU's TedX equivalent), and cultural celebrations that reflect our university's rich international diversity, representing citizenship in over 55 countries.

ITU's Student Government Association (SGA) works directly with ITU's Executive

**Staff, has a voice directly with the CEO, and fosters an amazingly dynamic environment for students who are driven to entrepreneurship and Silicon Valley's rich start-up culture. With ITU's most recent collaborations with local industry partnerships, ITU students now have a seamless path into developing their own ideas, pitching their stack to actual VC's and if chosen, incubating their startups within ITU's expanded 2020 ecosystem, without ever leaving the building.**

**We are thrilled to have you join us. We value our students and our pride as educators come from providing you a solid, industry-relevant educational experience ensuring your professional and personal success.**

**What I write here, you will feel as you enter the doors of ITU, meet with fellow multi-disciplined students, interact with your instructors, and experience the ever-changing dynamic of ITU's curriculum offerings, which is lock-step with industry. Study hard at ITU, think creatively, and dedicate at least a portion of the formidable capabilities you develop at ITU to contribute back to the betterment of the global community.**

**ITU was founded on the fundamental belief that education is the non-violent solution to many of the world's chronic challenges. You are now a part of the ITU culture, and that means, we expect you to do some good in the world!**

Sincerely,

**Yau-Gene Chan  
President/CEO  
International Technological University**



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## ABOUT ITU

International Technological University (ITU) is based in Silicon Valley, the technology center of the world. The University provides a practical academic experience for students who want to learn directly from the professionals shaping high tech industries. Silicon Valley's brightest minds have always been part of our faculty, advisory board, and Board of Trustees, resulting in a premier education in technology and business.

ITU's Silicon Valley faculty members bring a high-level industry experience from innovative companies like Google and Oracle to the courses they teach, giving students an edge on the latest discoveries and implementations in tech innovation and empowering their careers.

### VISION

To empower people and advance global prosperity through inventive, industry-linked Silicon Valley education.

### MISSION

ITU pioneers a modern, industry-focused educational model to deliver education globally. ITU's educational pedagogy cultivates innovative thinking, ethical leadership, and entrepreneurial spirit through practical, industry relevant curriculum that reflects Silicon Valley's culture. ITU closes the employment skills gap and empowers people to lead successful, enriching lives as meaningful contributors to the global community.

### PURPOSE

The purpose of ITU is to foster excellence in education for students particularly interested in the high-tech entrepreneurial field. All our programs have an applied nature, with an emphasis on specialty areas tailored to the market needs of Silicon Valley companies. Students are actively encouraged to affiliate or intern with relevant local industry firms from the very beginning of their academic studies as an integral part of ITU's academic pedagogy. As such, the hallmarks of an ITU education include:

- A special focus on practical engineering, business, biotech, and media arts research projects.
- Relevant internships integrated into academic programs from the beginning of a student's tenure.
- Multicultural awareness through the international exchange of scholars and students from locations around the globe.

- Systemically designed, competency-based courses that utilize innovative instructional methods.
- Cross-disciplinary curriculum that encourages students to look beyond their own fields and generate new possibilities.
- Programs that meet the high standards of both the ITU Advisory Board, which consists of prominent Silicon Valley industry leaders, and the WASC Senior College and University Commission (WSCUC).

### HISTORY

After earning his Ph.D. in Electrical Engineering from the University of Illinois, Urbana-Champaign, ITU's Founder, Dr. Shu-Park Chan, joined Santa Clara University's electrical engineering department, where he served for 30 years, eventually becoming Dean of the Engineering School. Dr. Chan's department began with a mere 50 students, and under his direction, over 1,200 students eventually enrolled. Because of his cutting-edge research in the area of graph theory and network topology, his Ph.D. students went onto become the co-founders of Cadence, ATMEL, Microelectronics Technologies, Oak Technology, Inc. and many other pillar companies that created the Silicon Valley phenomenon. Conservatively speaking, over 80% of all microprocessors designed and developed within the last 25 years throughout the world have been created or touched by technology generated from Dr. Chan's students.

In 1994, Dr. Chan retired from SCU and founded ITU to be the world's first global networked university model. While pioneering high-tech engineering education at SCU, Dr. Chan recognized that proper engineering education bridges the "relevance gap" - found in most academic institutions - between academic theory and practical application. Together with Silicon Valley technology, business, media, and venture capital leaders, he built ITU as a solution for graduate students looking for practical, industry-relevant training.

In February 2013, ITU received regional accreditation from the WASC Senior College and University Commission (WSCUC). Now in its 25th year, the University offers ten accredited graduate degrees through six departments of study. Today, ITU continues to provide its students an industry-relevant education that focuses on cross-disciplinary studies and practical work experience. ITU faculty have worked at leading Silicon Valley institutions such as NASA, Google, Intel, and Oracle; and its alumni have had successful careers in companies such as Microsoft, Hewlett Packard, Cisco, among others. Currently, more than 1,000 graduate students from over 54 countries are enrolled in the university, making it a dynamic and

exciting place to work and study.

## ABOUT THE FOUNDER



*"We are now in the new millennium with the challenge of solving contemporary problems while achieving the unfinished agenda of the future. Modern society must engage in a constant search for the good in its quest for the better."*

**Dr. Shu-Park Chan**  
**ITU Founder & First President, 1929-2013**

A role model to many, Dr. Shu-Park Chan was a bold visionary, a passionate leader in education, and a warm builder of community.

### Major Milestones:

- 1929 – Born in Canton, China as the 10th son of famous Chinese general Jitang Chen
- 1955 – Graduated from Virginia Military Institute with a bachelor's degree in Electrical Engineering
- 1962 – Graduated from University of Illinois, Urbana-Champaign with a Ph.D. in Electrical Engineering
- 1962 – Joined Santa Clara University as a Professor of Electrical Engineering and taught there for over thirty years
- 1972 – Co-wrote the textbook Analysis of Linear Networks and Systems: A Matrix-Oriented Approach with Computer Applications, one of his many research publications
- 1989 – Became Dean of the School of Engineering at Santa Clara University
- 1993 – First Asian American appointed to the Fulbright Scholarship Board
- 1994 – Founded International Technological University and served as President until 2011

## INSTITUTIONAL LEARNING OUTCOMES

- Problem Solving
- Critical Thinking
- Communication
- Team Work
- Technical Literacy
- Research
- Responsibility

## DEGREES OFFERED

- Bachelor of Science in Computer Science
- Master of Business Administration
- Master of Science in Computer Engineering
- Master of Science in Computer Science
- Master of Science in Digital Arts
- Master of Science in Electrical Engineering
- Master of Science in Electrical Engineering and Computer Engineering
- Master of Science in Engineering Management
- Master of Science in Information and Cybersecurity
- Master of Science in Software Engineering
- Doctor of Business Administration
- Doctor of Philosophy in Electrical Engineering
- Doctor of Philosophy in Interdisciplinary Sciences

## WSCUC POLICY ON TEACH-OUT PLANS AND AGREEMENTS

An institution accredited by the Commission must submit to the Commission for its prior approval a teach-out plan or agreement upon the occurrence of any of the following:

1. The Secretary of Education notifies WSCUC that the Secretary has initiated an emergency action against an institution in accordance with section 487(c)(1)(G) of the HEA or an action to limit, suspend, or terminate an institution participating in any Title IV, HEA program, in accordance with section 487(c)(1)(F) HEA, and that a teach-out plan is required.
2. WSCUC acts to withdraw, terminate, or suspend accreditation or candidacy of the institution.
3. The institution notifies WSCUC that it intends to cease operations entirely or close a location that provides one hundred percent of at least one program.
4. A state licensing or authorizing agency notifies WSCUC that an institution's license or legal authority to provide an educational program has been or will be revoked.

A teach-out plan means a written plan developed by that institution that provides for the equitable treatment of its own students if an institution, or an institutional location that provides one hundred percent of at least one program, ceases to operate before all students have completed

their program of study, and may include if required by the institution's accrediting agency, a teach-out agreement between institutions. A teach-out agreement means a written agreement between two institutions that provides for equitable treatment of students under these circumstances. WSCUC may require an institution to enter into a teach-out agreement as part of its teach-out plan.

When an institution enters into a teach-out agreement with another institution, the initiating institution must submit the agreement to the Commission for approval prior to its implementation. The teach-out agreement may be approved only if the agreement is between institutions that are accredited by a nationally recognized accrediting agency; and

1. Must be consistent with applicable standards of accreditation and Commission Policies;
2. Must provide for the equitable treatment of students by ensuring that the teach-out institution has the necessary experience, resources, and support services to provide an educational program that is of acceptable quality and reasonably similar in content, structure, and scheduling to that provided by the institution that is closing or discontinuing its program(s), to remain stable, carry out its mission, and to meet all obligations to its existing students;
3. Must ensure that the teach-out institution can provide students access to the program and services without requiring them to move or travel substantial distances;
4. Must provide for notification of another accrediting agency if the teach-out institution holds accreditation from that agency; and
5. Must specify additional charges, if any, levied by the teach-out institution and provide for notification to the students of any additional charges

If an institution the Commission accredits or has granted candidacy to closes without a teach-out plan, the Commission must work with the Department of Education and the appropriate State agency, to the extent feasible, to assist students in finding reasonable opportunities to complete their education without additional charges.

The Commission has adopted Guidelines for Closing an Institution, available from the Commission office.

The University will provide all undergraduate and graduate students currently in the affected programs who have at least 3 hours in the major, an opportunity to complete degree requirements during a "teach out" period. Dean or designees will

inform affected students of the program closure and the time within which they must complete the program. Students should work closely with the Office of the University Registrar or designee, who will be knowledgeable about the projected course offerings of the terminated program. New students will not be enrolled in the program. The university will follow all rules and regulations stated by WSCUC and BPPE.

For the fully online degree option to existing university Master's programs, should it be necessary to teach out the online versions of these programs, the same WSCUC approved policies will serve as a guide, and apply to all students who have enrolled in these programs.

1. Students in the online schedule of offerings will be informed of the teach-out of the fully online versions of the program and a teach-out schedule of online offerings in that program will be promulgated, which will permit students in continuous enrollment to complete the required coursework in the online delivery format.
2. All degree students may complete all degree requirements through on-campus offerings, in either weekend or weeknight schedules or a combination thereof.
3. For all students who cannot complete all course requirements in the teach-out period, a policy to permit students to transfer degree-relevant coursework from other WSCUC or regionally accredited institutions will be adopted to ensure students access to completing course requirements.
4. If needed, and with prior WSCUC approval, an articulation agreement will be developed to allow smooth transfer of ITU students into another regionally accredited university's graduate programs in that discipline.
5. In exceptional cases, and where needed, individual teach-out plans will be developed for any students in the program for whom the above accommodations do not permit timely completion of their respective degree programs.

## UNIVERSITY LOCATION

ITU's location in the heart of Silicon Valley provides access to the most well-known hubs for entrepreneurial activity. The innovative atmosphere of Silicon Valley, and the wider San Francisco Bay Area, provides students with a unique environment from which to draw inspiration. The excitement, innovation, and opportunity in Silicon Valley is dispensed into the classrooms through our reputable faculty members and curriculum. The passion for technology, entrepreneurship, and

**commerce drives our University.**

**Mailing Address:**  
**2010 El Camino Real, #852, Santa Clara, CA 95050**

**Physical Address:**  
**3120 Scott Blvd., Santa Clara, CA 95054**

**Tel: (888) 488 - 4968**  
**Fax: (408) 331-1026**  
**[www.itu.edu](http://www.itu.edu)**

## ADMISSIONS

### ROLLING ADMISSIONS

Applicants may apply for admission into any of the trimester terms (Fall, Spring, Summer) each year. Completed applications are reviewed on a rolling basis during the admission cycles.

### APPLICATION DEADLINES

Applicants should consult the ITU website and apply with in the specified deadlines.

### MASTER'S DEGREE PROGRAM

#### ADMISSIONS POLICY

Students applying for admission into ITU master's degree programs are expected to demonstrate the knowledge, skills, and experience necessary to succeed in a rigorous graduate educational environment. As such, successful applicants who are admitted to the University should have earned (the equivalent of) a US bachelor's degree with a cumulative 2.75 GPA or above, or (the equivalent of) a US master's degree with a cumulative 3.0 GPA or above. Degrees earned in the United States must be from a regionally accredited US institution. In some cases, ITU may also consider other evidence of readiness for academic studies at the graduate level, including: outstanding undergraduate work in the major, completion of graduate-level coursework at a 3.0 GPA or above, post-baccalaureate studies, and professional certifications.

Given the diversity of grading scales and accreditation standards worldwide, ITU requires that any foreign credentials (i.e., undergraduate/graduate diploma and transcript) be evaluated by an approved third-party evaluation service. The University will only accept foreign credentials that are deemed by the approved service provider as equivalent to a US bachelor's or master's degree. International applicants will also need to provide proof of English proficiency (see ITU's English Proficiency policy).

### ENGLISH PROFICIENCY POLICY

The ability to communicate effectively in English - to comprehend, read, write, and speak the language fluently - is vital to student success. ITU applicants are therefore expected to demonstrate English proficiency as a part of the application process.

International students whose native language is not English must provide evidence of English

proficiency. English competency tests (e.g., TOEFL, IELTS Academic) are designed to provide the Office of Admissions with a guide to measure potential academic success.

Applicants are required to demonstrate English proficiency by one of the following means:

- A TOEFL score of 72 or higher (Internet-based test score (ibt)).
- An IELTS Academic score of 6.0 or higher.

Test scores are valid for two years from the date when the tests are taken. If the test score is older than two years, the student will be required to resubmit a valid test score.

Valid, official scores must be sent to ITU's Office of Admissions directly from the testing service. If a TOEFL score is being sent, ITU's institution code is 4446. If you are sending an IELTS Academic score, please be sure to select ITU from the list of available institutions.

Non-US citizen students who are currently residing in the U.S. and seeking to transfer to ITU may demonstrate English language proficiency as described above. In addition, such students may also demonstrate proficiency by attaining a score of 64 or higher on the MTELP Level 3 Exam, indicating a CEFR level B2 or higher. The administration of the MTELP Exam must be proctored and take place on the ITU campus.

International students may be exempted from the English proficiency requirement under the following circumstances:

1. The applicant has earned an undergraduate degree from a regionally accredited institution in the U.S.  
The undergraduate degree must consist of a minimum of 120 trimester credit hours, with the majority of credit hours earned in the U.S. from a regionally accredited institution. Waivers will not be considered for credit hours earned at a branch campus in a non-English speaking country or degrees earned through distance learning programs. Credential evaluation may be required for transfer credit hours from foreign institutions.
2. The applicant has earned a graduate degree from a regionally accredited institution in the U.S.  
The graduate degree must consist of a majority of credit hours earned in the U.S. from a regionally accredited institution. Waivers will not be considered for credit hours earned at a branch campus in a non-English speaking country or degrees earned through distance learning programs. Credential evaluation may be required for transfer credits from foreign institutions.
3. An accredited undergraduate or graduate degree was earned in a non-U.S., Anglophone country, and the language of instruction must have been English.  
The majority of the credit hours must be earned

from an Anglophone institution. Waivers will not be considered for credit hours earned at a branch campus in a non-English speaking country.

Countries that qualify for the waiver include: Antigua, Australia, Barbados, Bermuda, Bahamas, Belize, British Virgin Islands, Canada (except Québec), Cayman Islands, Dominica, Grenada, Guyana, Ireland, Jamaica, New Zealand, Nevis & St. Kitts, St. Lucia, South Africa, St. Vincent, Trinidad & Tobago, Turks & Caicos, and the United Kingdom (England, Scotland, Northern Ireland & Wales).

4. The applicant's native language is English. Applicants can demonstrate native English language proficiency by providing appropriate documentation.
5. The applicant has completed an accredited ESL program in the U.S., or in a non-US Anglophone country, listed in criteria #3, with a proficiency level equivalent to a B2 or above according to the Common European Framework (CEFR). The applicant must submit official transcripts and an official copy of the certificate of completion to the Office of Admissions. The transcript must demonstrate a CEFR level of B2 or above in all areas.

ITU considers an English language program as accredited if it:

1. Is accredited by one of the following accreditation agencies recognized by the Secretary of the Department of Education (DoE):
  - a. Commission on Language Program Accreditation (CEA)
  - b. Accrediting Council for Continuing Education & Training (ACCET)Or
2. Is a listed member of the American Association of Intensive English Program (AAIEP)  
Or
3. Is accredited by a government-recognized agency in an approved Anglophone country.

## MASTER'S LEVEL ADMISSIONS APPLICATION REQUIREMENTS

All ITU applications must include:

- A completed new student application.
- Sealed official transcripts from all universities attended. Transcripts must be mailed directly from the institution or through an official U.S. e-Transcript provider.
- International Students Only: Foreign credential evaluations for all transcripts must be submitted. Please see <http://itu.edu/admissions/approved-credential-evaluation-services> for a list of approved foreign credential evaluation services.
- Grade point average (GPA) requirements: A cumulative graduate GPA of 3.0, or a cumulative undergraduate GPA of 2.75.
- Statement of Purpose - an essay describing your personal and professional goals and reasons for obtaining your graduate degree. Word count must not exceed 750 words.
- Resumé - Must not exceed two (2) pages.

## SUPPLIMENTARY MATERIALS

Most students who are admitted to ITU do not submit supplemental materials. All of the required documents will be used to evaluate your application. In the case that you do not meet the minimum academic requirements, supplemental materials may be considered. Only the following supplemental materials may be considered.

- Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT) scores recommended. Scores must be sent directly from the testing center.
- Two Letters of Recommendation. Letters should mention the student's professional and academic experience, as well as their potential to succeed in graduate school.
- Work experience
- Professional achievements

All applicants must submit identification records to the Office of Admissions in the form of a valid or legitimate U.S. government identification card or passport.

\* All documents submitted for admission become property of the University and will not be returned.

## DOCTORAL LEVEL ADMISSIONS APPLICATION REQUIREMENTS

ITU's doctoral programs have extensive program-specific admissions requirements. Students

**PROOF OF ENGLISH LANGUAGE PROFICIENCY**  
Non-US citizen students who are currently residing in the U.S. and seeking to transfer to ITU may demonstrate English language proficiency by all the means described in the current 2016-2017 catalog. In addition, such students may also demonstrate proficiency by means of successful passage of the MTELP Level 3 Exam with a score of 64 or higher, proctored and administered on the ITU campus, that indicates a CEFR level B2 or higher.

interested in applying for admission into a doctoral program should contact the Office of Admissions for more information.

## **ADDITIONAL REQUIREMENTS FOR INTERNATIONAL APPLICANTS**

International applicants who have completed their post-secondary education from an institution outside the U.S. must hold a degree from a university recognized by their Ministry of Education as a degree-granting institution.

International applicants coming from overseas are recommended to apply within the first month of each admission cycle (May, September, January) to ensure enough processing time for visa, if admitted.

In addition to the regular application requirements, international applicants must also provide:

1. Foreign credential evaluation for any non-US degrees and foreign credit hours transferred to a US undergraduate or graduate degree. ITU will accept a course-by-course evaluation completed by one of our approved credential evaluation service providers: <http://itu.edu/evaluations>.
2. Proof of English proficiency. Students may demonstrate English proficiency through one of the following ways:
  - a. Test of English as a Foreign Language (TOEFL) examination. ITU looks for a score of 72 or better for the internet-based test (ibt).
  - b. International English Language Testing System (IELTS Academic) examination. ITU looks for a band score of 6.0 or better for the academic module.
  - c. Accredited bachelor's or master's degree from a regionally accredited US institution or from a native English-speaking country.
  - d. Evidence that the applicant's first language is English. Applicant should submit documentation that s/he was schooled in a country where English is the official language and language of instruction.
  - e. Transcript demonstrating the completion of an accredited ESL program

in the US, or in a non-US Anglophone country, with a proficiency level equivalent to a B2 or above, according to the Common European Framework (CEFR). Note: All documents submitted for admission become property of the University and will not be returned.

Note: All documents submitted for admission become property of the University and will not be returned.

## **SECOND ITU MASTER'S DEGREE ADMISSIONS REQUIREMENTS**

At ITU, the term "second master's degree" is used for students who received their first master's degree at ITU and would like to pursue a second ITU master's degree in a different field. Students who completed their first master's degree at another institution are not considered "second master's students" at ITU.

Current and former ITU students who would like to apply for their second ITU master's degree must adhere to the current master's level admissions application requirements and admission cycles.

Students applying for a second ITU master's degree before their first degree has been conferred are required to submit an official ITU transcript and must be in good academic standing. If all admission requirements are met, these applicants will be offered a "Conditional Admission." Upon completion of their first ITU master's degree, they will be offered full admission and may matriculate into their new program as normal.

## **CONDITIONAL ADMISSION**

Applicants that meet ITU's academic criteria but do not meet ITU's English proficiency requirements may be offered a "Conditional Admission" from the Office of Admissions. A conditional admission is valid for no longer than two terms from the date of acceptance and current admission records will be kept on file during this time. The conditional admission will be fulfilled if the student provides sufficient evidence of English proficiency through one of the following conditions stated in the English Proficiency Policy.

Conditional Admission may be granted to Second Master's Degree applicants whose first ITU degree has not been conferred. Please refer to the Second ITU Master's Degree Admissions Requirements section for additional details.

## **ADMISSIONS EXCEPTIONS**

Program Admissions Criteria and Processes:  
In a unique case beyond the uniform minimum requirements for admission, a department may choose any criteria that is appropriate as a basis for its evaluation. This includes but is not limited to undergraduate and graduate grade point averages, work experience, test scores, letters of recommendations, and evidence of past achievements. Admissions criteria and decision procedures are subject to review by the Exceptions Committee.

## **PROVISIONAL ADMISSION POLICY**

In cases where a student meets the academic requirements for admission to ITU, but experiences delays in supplying supplemental documentation to support their application, the Admissions Exceptions Committee may grant a provisional admission for the student to enroll for the first term. The student would receive an acceptance letter that describes the necessary provisions for completing the admission process and sets a deadline for the student to complete those requirements. The official admission will not be granted until the necessary items, such as an official final transcript showing award of the bachelor's degree or master's degree, are received.

All admission provisions must be cleared by the end of the first trimester of enrollment. In order to avoid any difficulties, students are strongly encouraged to meet the terms of their provisional admission prior to the start of the anticipated trimester. If a student fails to clear their provisional status by the end of the first enrolled term, an administrative hold will be placed on their academic record, which may result in their inability to register for classes and/or continue their graduate studies in future terms. The Office of Admissions will monitor provisionally accepted students and notify the appropriate departments about students who do not complete their requirements. The University retains the right to rescind admissions decisions and cancel registration for any student who is found not to be eligible after final admissions documentation has been evaluated.

## **ACCEPTING YOUR OFFER OF ADMISSION**

All newly admitted students who have been granted admission to ITU will need to confirm their intent to enroll in order to secure a seat in their program. It is very important that you secure a seat for the upcoming term by completing the enrollment process as soon as possible. If the enrollment

process is not completed, your spot at ITU will be forfeited and you will need to reapply.

Successful completion of the enrollment process will allow students to register for classes, initiate processing of their student ID card, among other services.

Students who are no longer able to attend ITU must contact the Office of Admissions immediately to discuss options (see Deferred Admissions). If the student has registered for classes already, the student must drop those courses in order to receive a refund. Some fees are non-refundable. If the student does not defer their enrollment and decides later in the future to attend ITU, the student must reapply for admission and meet the admission requirements and deadlines as stated above.

International students should also contact the International Students Office.

## **DEFERRED ADMISSION**

If you have been admitted to ITU, but can no longer enroll by the start date, you may wish to postpone your admission until the next entry term. The last day to submit deferral requests is the add/drop deadline, i.e. two weeks after the start of the term you are originally accepted. Once admitted, you can defer your admission only once; after that you must re-apply. Students must pay their enrollment deposit before they are eligible to request a Deferred Admissions. Submitting a request for deferral is not a guarantee of approval. Upon approval of deferment, please note you may not enroll in another academic program at a different college or university, during your deferment period.

A completed Admissions Deferral Request Form must be submitted to the Office of Admissions. Please contact [admissions@itu.edu](mailto:admissions@itu.edu) for deferment deadlines.

F-1 International Students who are currently in the U.S. who apply for deferment must be able to maintain lawful F-1 status within the 5-month maximum transfer time between schools. F-1 international students physically residing outside the U.S. may also apply for deferment. Students should speak with an International Student Advisor at ITU to defer admission.

## **TRANSFER CREDIT POLICY**

Applicants who have taken graduate-level courses at other regionally accredited US colleges and universities may, at the time of application for admission, petition to transfer course credit hours

towards their ITU degree program. The relevant Department Chair grants final approval, subject to the following criteria:

A grade of B or better in the course is required for any credit hours to be transferred.

No more than 9 graduate level credit hours may be transferred from other regionally accredited US colleges and universities.

Courses transferred must be substantially equivalent to courses offered at ITU.

The courses to be transferred may substitute for electives but not for core courses in the ITU degree program.

Grades from previous institutions will not be transferred and will not affect GPA.

In no case will a petition for transfer credit be considered later than the end of the first trimester of a student's enrollment.

\*Note: Required additional preparatory coursework may be taken at ITU or at an approved, regionally accredited US community college or university.

### **ADMISSION POLICIES FOR RECIPIENTS OF THREE-YEAR BACHELOR'S DEGREE OR EQUIVALENT**

Individuals who have earned a three-year Bachelor's degree or a three-year diploma from an institution recognized by the Ministry of Education or corresponding governmentally approved higher education authorizing agency in their respective countries may apply for admission to the relevant Master's degree program at ITU, provided that specified, additional preparatory work\* is completed.

Applicants who have earned an Associate's degree and who have completed ninety credit hours or more of coursework in a regionally accredited U.S. community college or from a regionally accredited U.S. university may also apply for admission to the relevant Master's degree program, provided that specified, additional preparatory work\* is completed.

For each applicant who lacks the equivalent of a relevant U.S. Bachelor's degree, an evaluation of the applicant's undergraduate transcript(s) will be conducted by the appropriate Department Chair or designee, who will determine what additional coursework must be completed for the applicant to be sufficiently prepared to pursue graduate coursework in that field of study.

Students will be eligible to take graduate courses at ITU concurrently with the additional preparatory work. However, the additional required preparatory work will be completed prior the pursuit of any advanced coursework in that program for which the required foundational coursework is determined to be a prerequisite.

## FINANCIAL INFORMATION

### TUITION AND FEES FOR A BACHELOR'S PROGRAM

The following sample tuition and fees schedule applies to all International Bachelor's program students:

	FALL TRIMESTER	SPRING TRIMESTER	SUMMER TRIMESTER	ACADEMIC YEAR
TUITION <sup>9</sup>	\$7,200	\$7,200	\$7,200	\$21,600
REGISTRATION FEE <sup>2,3</sup>	\$50	\$50	\$50	\$150
TECHNOLOGY FEE <sup>3</sup>	\$200	\$200	\$200	\$600
SGA FEE <sup>10</sup>	\$15	\$15	\$15	\$45
VTA FEE <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	\$42	\$42	\$129
TOTAL	\$7,510	\$7,507	\$7,507	\$22,524

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

### HEALTH INSURANCE COVERAGE

Health Insurance Coverage is mandatory. Starting from fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage **prior to** course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>.

All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

Note: There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

The following sample tuition and fees schedule applies to all Domestic Bachelor's program students:

	FALL TRIMESTER	SPRING TRIMESTER	SUMMER TRIMESTER	ACADEMIC YEAR
TUITION <sup>9</sup>	\$5,400	\$5,400	\$5,400	\$16,200
REGISTRATION FEE <sup>2,3</sup>	\$50	\$50	\$50	\$150
TECHNOLOGY FEE <sup>3</sup>	\$200	\$200	\$200	\$600
SGA FEE <sup>10</sup>	\$15	\$15	\$15	\$45
VTA FEE <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	\$42	\$42	\$129
TOTAL	\$5,710	\$5,705	\$5,705	\$17,124

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

#### **HEALTH INSURANCE COVERGE**

Health Insurance Coverage is mandatory. Starting from fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage **prior to** course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>.

All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

**Note:** There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

#### **TOTAL COST FOR A BACHELOR'S PROGRAM**

The following sample tuition and fees table is for the entire bachelor's program, assuming full time enrollment per trimester:

	FEES PER TRIMESTER	TOTAL CREDITS/TRIMESTERS TO COMPLETE THE PROGRAM	TOTAL CHARGES DUE FOR THE ENTIRE PROGRAM
INTERNATIONAL TUITION <sup>10</sup>	\$600 per Credit Hour	60 Credit Hours / 5 Trimesters	\$36,000
DOMESTIC TUITION <sup>10</sup>	\$450 per Credit Hour	60 Credit Hours / 5 Trimesters	\$27,000
REGISTRATION FEE <sup>2,3</sup>	\$50	5 Trimesters	\$250
TECHNOLOGY FEE <sup>3</sup>	\$200	5 Trimesters	\$1,000
SGA FEE <sup>10</sup>	\$15	5 Trimesters	\$75
VTA PASS <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	5 Trimesters	\$213
APPLICATION FEE <sup>5</sup>			\$100
ORIENTATION FEE <sup>5,6</sup>			\$250
PETITION TO GRADUATE			\$200
<b>TOTAL (INTERNATIONAL)</b>			<b>\$38,088</b>
<b>TOTAL (DOMESTIC)</b>			<b>\$29,088</b>

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

#### **HEALTH INSURANCE COVERGE**

Health Insurance Coverage is mandatory. Starting from fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage **prior to** course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>.

All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

**Note:** There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

## TOTAL COST FOR THE BRIDGE PROGRAM

The following sample tuition and fees table is for the entire bridge program in all academic programs, assuming 6-9 credit hours taken per trimester:

	FEES PER TRIMESTER	TOTAL CREDITS/TRIMESTERS TO COMPLETE THE PROGRAM	TOTAL CHARGES DUE FOR THE ENTIRE PROGRAM
TUITION <sup>7</sup>	\$500 per Credit Hour	12 Credit Hours	\$6,000
REGISTRATION FEE <sup>2,3</sup>	\$50	2 Trimesters	\$100
TECHNOLOGY FEE <sup>3</sup>	\$200	2 Trimesters	\$400
SGA FEE <sup>10</sup>	\$15	2 Trimesters	\$30
VTA FEE <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	2 Trimesters	\$87
APPLICATION FEE <sup>3,5</sup>			\$100
ORIENTATION FEE <sup>5,6</sup>			\$250
PETITION TO GRADUATE			\$200
<b>TOTAL</b>			<b>\$7,167</b>

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

## HEALTH INSURANCE COVERAGE

Health Insurance Coverage is mandatory. Starting from fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage prior to enrollment.

Note: There are different methods of payment  
 - Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.

course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>.

All students are required to provide a proof of insurance coverage to the Finance Department

- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

If students claim proficiency in any of the prerequisite courses, they can also take a challenge test.

**The cost of the test is \$400. Students need to talk to the chair of the program to know how to take the test.**

## TUITION AND FEES FOR A MASTER'S PROGRAM

The following sample tuition and fees schedule applies to students who started their program prior to Fall 2020:

	FALL TRIMESTER	SPRING TRIMESTER	SUMMER TRIMESTER	ACADEMIC YEAR
TUITION <sup>1</sup>	\$6,300	\$6,300	\$6,300	\$18,900
REGISTRATION FEE <sup>2,3</sup>	\$50	\$50	\$50	\$150
TECHNOLOGY FEE <sup>3</sup>	\$200	\$200	\$200	\$600
SGA FEE <sup>10</sup>	\$15	\$15	\$15	\$45
VTA FEE <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	\$42	\$42	\$129
<b>TOTAL</b>	<b>\$6,610</b>	<b>\$6,607</b>	<b>\$6,607</b>	<b>\$19,824</b>

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

### **HEALTH INSURANCE COVERAGE**

Health Insurance Coverage is mandatory. Starting from fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage **prior to** course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>.

All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

**Note:** There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

### **TOTAL COST FOR A MASTER'S PROGRAM**

The following sample tuition and fees table is for the entire Master's program, assuming full time enrollment per trimester. The tuition is for students who started their program prior to Fall 2020:

	FEES PER TRIMESTER	TOTAL CREDITS/TRIMESTERS TO COMPLETE THE PROGRAM	TOTAL CHARGES DUE FOR THE ENTIRE PROGRAM
TUITION <sup>1</sup>	\$700 per Credit Hour	36 Credit Hours / 4 Trimesters	\$25,200
REGISTRATION FEE <sup>2,3</sup>	\$50	4 Trimesters	\$200
TECHNOLOGY FEE <sup>3</sup>	\$200	4 Trimesters	\$800
SGA FEE <sup>10</sup>	\$15	4 Trimesters	\$60
VTA PASS <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	4 Trimesters	\$171
APPLICATION FEE <sup>5</sup>			\$100
ORIENTATION FEE <sup>5,6</sup>			\$250
PETITION TO GRADUATE			\$200
<b>TOTAL</b>			<b>\$26,981</b>

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

### **HEALTH INSURANCE COVERAGE**

Health Insurance Coverage is mandatory. Starting from fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage **prior to** course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>. All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

**Note:** There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

### **TUITION AND FEES FOR A MASTER'S PROGRAM - Nugget program**

The following sample tuition and fees schedule applies to all students who will start their program in fall 2020 with the nugget courses, and will enroll in 10 credits per trimester:

	FEES PER TRIMESTER	TOTAL CREDITS/ TRIMESTERS TO COMPLETE THE PROGRAM	TOTAL CHARGES DUE FOR THE ENTIRE PROGRAM	ACADEMIC YEAR
TUITION <sup>11</sup>	\$6,500	\$6,500	\$6,500	\$19,500
REGISTRATION FEE <sup>2,3</sup>	\$50	\$50	\$50	\$150
TECHNOLOGY FEE <sup>3</sup>	\$200	\$200	\$200	\$600
SGA FEE <sup>10</sup>	\$15	\$15	\$15	\$45
VTA FEE <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	\$42	\$42	\$129
<b>TOTAL</b>	<b>\$6,810</b>	<b>\$6,807</b>	<b>\$6,807</b>	<b>\$20,424</b>

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

#### **HEALTH INSURANCE COVERAGE**

Health Insurance Coverage is mandatory. Starting from fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage prior to course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>.

All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

Note: There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

#### **TOTAL COST FOR A MASTER'S PROGRAM**

The following sample tuition and fees table is for the entire Master's program with nuggets, assuming full time enrollment per trimester:

	FEES PER TRIMESTER	TOTAL CREDITS/ TRIMESTERS TO COMPLETE THE PROGRAM	TOTAL CHARGES DUE FOR THE ENTIRE PROGRAM
TUITION <sup>11</sup>	\$650 per Credit Hour	39 Credit Hours / 4 Trimesters	\$25,350
REGISTRATION FEE <sup>2,3</sup>	\$50	4 Trimesters	\$200
TECHNOLOGY FEE <sup>3</sup>	\$200	4 Trimesters	\$800
SGA FEE <sup>10</sup>	\$15	4 Trimesters	\$60
VTA PASS <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	4 Trimesters	\$171
APPLICATION FEE <sup>3,5</sup>			\$100
ORIENTATION FEE <sup>5,6</sup>			\$250
PETITION TO GRADUATE			\$200
<b>TOTAL</b>			<b>\$27,131</b>

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

## **HEALTH INSURANCE COVERGE**

Health Insurance Coverage is mandatory. Starting form fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage **prior to** course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>. All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

**Note:** There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

## **TUITION AND FEES FOR PH.D. IN ELECTRICAL ENGINEERING AND INTERDISCIPLINARY SCIENCES PROGRAMS**

The following sample tuition and fees schedule applies to all students:

	FALL TRIMESTER	SPRING TRIMESTER	SUMMER TRIMESTER	ACADEMIC YEAR
TUITION <sup>7</sup>	\$9,000	\$9,000	\$9,000	\$27,000
REGISTRATION FEE <sup>2,3</sup>	\$50	\$50	\$50	\$150
TECHNOLOGY FEE <sup>3</sup>	\$200	\$200	\$200	\$600
SGA FEE <sup>10</sup>	\$15	\$15	\$15	\$45
VTA FEE <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	\$42	\$42	\$129
<b>TOTAL</b>	<b>\$9,983.65</b>	<b>\$9,980.65</b>	<b>\$9,980.65</b>	<b>\$27,924</b>

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

## **HEALTH INSURANCE COVERGE**

Health Insurance Coverage is mandatory. Starting form fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage **prior to** course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>.

All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

**Note:** There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

## **TOTAL COST FOR PH.D. IN ELECTRICAL ENGINEERING AND INTERDISCIPLINARY SCIENCES PROGRAMS**

The following sample tuition and fees table is for the entire Electrical Engineering or Interdisciplinary

	FEES PER TRIMESTER	TOTAL CREDITS/ TRIMESTERS TO COMPLETE THE PROGRAM	TOTAL CHARGES DUE FOR THE ENTIRE PROGRAM
TUITION <sup>7</sup>	\$1,000 per Credit Hour	60 Credit Hours	\$60,000
REGISTRATION FEE <sup>2,3</sup>	\$50	7 Trimesters	\$350
TECHNOLOGY FEE <sup>3</sup>	\$200	7 Trimesters	\$1,400
SGA FEE <sup>10</sup>	\$15	7 Trimesters	\$105
VTA FEE <sup>3,4</sup>	\$45 for new students only. \$42 for continuing students.	7 Trimesters	\$297
APPLICATION FEE <sup>3,5</sup>			\$100
ORIENTATION FEE <sup>5,6</sup>			\$250
PETITION TO GRADUATE			\$200
<b>TOTAL</b>			<b>\$62,702</b>

**Fees must be cleared before beginning of each term or during add/drop period. Late payment is subject to \$300 penalty fee.**

#### **HEALTH INSURANCE COVERGE**

Health Insurance Coverage is mandatory. Starting from fall 2020, students will not be enrolled in health insurance through ITU. They should enroll in health insurance directly through JCB or provide JCB their proof of coverage **prior to** course registration. For more information follow the link: <https://www.itu.edu/admissions/admitted-students/health-insurance>.

All students are required to provide a proof of insurance coverage to the Finance Department prior to enrollment.

**Note:** There are different methods of payment

- Credit/Debit/e-Check: Please be informed that payments by Credit/Debit Card/ e-Check are subject to 3% charges processing fees. ITU uses various outside Financial Institutions to process the credit/debit card, and e-check payments. The 3% charges is collected to pay these institutions for their services.
- Cash, Check: No processing fee charges, and
- Wire transfer: No processing fee charges. For information about ITU bank account, contact the Finance Department.

#### **TOTAL COST FOR DOCTORATE IN BUSINESS ADMINISTRATION PROGRAM**

TUITION TYPE	TOTAL TUITION FOR ENTIRE PROGRAM
TOTAL PROGRAM TUITION	\$50,000
TOTAL PROGRAM TUITION (DOMESTIC)	\$37,500

#### **PAYMENT SCHEDULE AND DUE DATE**

Tuition is divided into three annual amounts, as shown in the table below. The entire amount for the first academic year is due by September 15th of the student's incoming year, with

subsequent annual tuition due by September 15th of each following year.

YEAR	TUITION AMOUNT	TUITION AMOUNT (DOMESTIC)	DUe DATE
YEAR ONE	\$20,000	\$15,000	By September 15th of the student's entering year.
YEAR TWO	\$15,000	\$11,250	By September 15th of the second calendar year of enrollment.
YEAR THREE	\$15,000	\$11,250	By September 15th of the third year of enrollment.

## **ALL OTHER NON-PROGRAM SPECIFIC FEES**

This is a list of all possible fees; certain fees may not apply to every student.

OTHER FEES (NON REFUNDABLE)	AMOUNT
APPLICATION FEE	\$100
ENROLLMENT TUITION DEPOSIT (APPLIED TO FIRST TRIMESTER TUITION AND FEES)	\$600
NUGGETS COURSE TUITION (3 CREDIT HOURS)	\$1,950
BOUNCED CHECK PENALTY FEE (PER CHECK)	\$50
REFUND FEE BY WIRE TRANSFER - INSIDE USA	\$100
REFUND FEE BY WIRE TRANSFER - OUTSIDE USA	\$125
ISO PROCESSING FEE	\$100
DIPLOMA REPLACEMENT FEE	\$100
GROUND SHIPPING FEE	\$25
OVERNIGHT SHIPPING FEE	\$50
INTERNATIONAL SHIPPING FEE	Additional Charges Will Apply
GRADUATION FEE	\$200
ORIENTATION FEE (MANDATORY ONE-TIME FEE FOR NEW STUDENTS PER PROGRAM)	\$250
INSTALLMENT PLAN ADMINISTRATION FEE	\$100 per trimester
EMPLOYER TUITION REIMBURSEMENT DEFERRED PAYMENT PLAN (ETR) FEE	\$50 per trimester
LAB SUPPLIES (DEPENDS ON CLASS)	\$50 - \$200
LATE PAYMENT FEE <sup>8</sup>	\$300
PAYMENT SWITCH FEE	\$50
STUDENT ID REPLACEMENT FEE	\$25
STUDENT VTA REPLACEMENT FEE	\$3
TRANSCRIPT FEE (PER COPY)	\$10 per copy + \$5 processing fee per order
W-9S SECOND TIME SUBMISSION FEE	\$50

1 Based on full-time registration of nine (9) credit hours. Tuition per credit hour is \$702 Registration Fee is \$50 per trimester. Additional \$50 (\$100 total) applies to students who register for classes during the Late Registration Period.

3 Fees are non-refundable once students register for classes, and will remain on the student's account if the student decides to drop all courses.

4 ITU is required by the City of San Jose to issue VTA passes to all enrolled students. Rates are subject to change by VTA. 5 Fees are non-refundable.

6 The Orientation Fee covers the New Student Orientation event, as well as pre-arrival assistance and services.

7 Based on full-time registration of nine (9) credit hours for coursework. Full time for dissertation portion of the program is at three (3) credit hours per trimester (not shown in sample tuition and fees table). Tuition is \$1,000 per credit hour.

8 Late Payment Fee will be applied one (1) month after the first day of the trimester if there is an outstanding balance on the account and the student is not enrolled in an installment plan.

9 Based on full time enrollment of 12 credit hours per trimester, at \$600 per credit hour for international students, and \$450 per credit hour for domestic students.

10 The Student Government Association Fee provides funding to ITU's Student Government Association (SGA). The SGA funds are managed by the SGA, whose members are ITU students elected every year to represent the student body and to run events and activities for the benefit of all students at ITU.

11 For the nugget program, based on full-time registration of ten (10) credit hours. Tuition per credit hour is \$650

12 If students dropped one or more credit hour(s) from the nuggets course, they are required to be enrolled in the nuggets course in another trimester and should pay the tuition fee (\$650/credit hour) for the new course.

Students are responsible for payment of all tuition and fees. ITU reserves the right to adjust the above schedule of fees at any time. Refer to our website for the latest fee table.

## COURSE MATERIALS AND SERVICES FEES

Students may be charged fees in some courses for the use, rental, or consumption of materials, tools, or equipment, or for the costs of materials or services necessary to provide a special supplemental educational experience. For example, course materials fees may cover the purchase of chemicals and glassware for a science laboratory or art supplies for an art studio class. They might also cover film rentals, field trips, or the purchase or rental of specific equipment. Courses that may be subject to the course materials fees are listed in the Class Schedule at <http://itu.edu>.

## PAYMENT DUE DATE

Tuition and fees for each trimester are due in full once the student registers for their courses. Students must submit payment in full or enroll in one of ITU's approved payment plans. ITU reserves the right to deny enrollment or cancel enrollment for students whose tuition and fees are not paid in full.

## ACCEPTED FORMS OF PAYMENT

- Pay Online at [MyITU](https://my.itu.edu): (<https://my.itu.edu>)
  - Credit/Debit Card
  - eCheck
- Pay in person at Finance Services with:
  - Cash
  - \* Credit/Debit Card
  - Cashier's Check, Money Order, Traveler's Check
  - Personal Check
- Pay by international wire transfer, credit card, Alipay, or Unionpay:
  - Visit the [Flywire](#) website to pay via wire transfer or other international

payments. (<https://www.flywire.com/pay/itu/>)

### • Pay by Tuition Payment Plan:

- **Installment Plan**  
Plan allows tuition to be paid in two to three payments over the first two months of the term.
- **Employer Tuition Reimbursement**  
For a student who participates in a tuition reimbursement program through his/her employer, this plan allows a qualified participant to defer university tuition payment until such time as they qualify for their employer reimbursement.

## INSTALLMENT PLAN POLICY

- Each installment plan is subject to a per trimester Installment Plan Administration Fee of \$100.
- **Installment Plans are only offered to students with good financial standing with ITU.**  
Students who have a bounced check record on their account due to non-sufficient funds are not eligible for any installment plans for the remainder of their tenure at ITU.
- **Students are responsible to make sure they have enough money in their bank account for the post dated checks.** If a student drop a class after the third week of the trimester, the student will still owe all outstanding balances and any default on payment will be subject to collection.
- **Any student who wishes to pay using an installment plan must download, print, and**

- complete a Promissory Note, and bring the completed form to the Department of Finance Services.
- Each installment plan consists of a minimum of two (2) to a maximum of three (3) installments.
- Students must submit all their installment plan checks along with their first payment. The checks should be post-dated and will only be deposited on the day the installment is due. If the due date falls on a weekend or holiday, the check will be deposited the following business day.
- The installment plan process is not completed until the Installment Plan Promissory Note and all post-dated checks have been submitted to the Department of Finance Services.
- Students who wish to cancel an installment check or switch payment, must contact the Department of Finance Services and complete the process prior to the installment due date.

### **INSTALLMENT PLAN PAYMENT SCHEDULE**

- The first installment is due on the day of registration, and the amount must be equal to or greater than three (3) credit hours of Master's or Doctoral program tuition, or four (4) credit hours of Bachelor's program tuition, in addition to all of the mandatory fees, including student health insurance.
- The second installment is due one (1) month after the first day of the trimester, and the amount must also be equal to or greater than three (3) credit hours of Master's or Doctoral program tuition, or four (4) credit

- hours of Bachelor's program tuition.
- The third installment is due two (2) months after the first day of the trimester. Any remaining balance must be paid with this final installment.

### **INSTALLMENT PLAN EXAMPLES**

The example below assumes a student registers for the full course load (9 credit hours for Master's and Doctoral programs, 12 credit hours for Bachelor's programs) in a trimester and already has existing health insurance coverage. Students must submit a health insurance waiver every trimester to prove existing coverage; otherwise, the student will be automatically enrolled into ITU's student health insurance plan and billed accordingly. Student health insurance payments must be paid along with all other fees on the first installment payment. For more information on student health insurance requirements and waiver information, please visit the Student Health Insurance section of the ITU website.

VTA fees listed in the examples below is the rate for continuing students in the Fall 2019 trimester, and may differ depending on the trimester and whether the student is receiving his/her VTA pass for the first time.

The CA (California Resident) discount is available to graduate program students who reside in California and are U.S. Citizen or Permanent Resident (Green Card). Please contact the Department of Admissions for more information on how to apply for the discount.

Fees are subject to change, so the total amount for installment plans may change over time.

### **INSTALLMENT PLAN PAYMENT SCHEDULE FOR BACHELOR'S PROGRAMS**

FEE TYPE	PAYMENT AMOUNT (INTERNATIONAL)	PAYMENT AMOUNT (DOMESTIC)	DUE DATE
Trimester Fees: \$200 - Technology Fee \$50 - Registration Fee \$15 - SGA Fee \$42 - VTA Fee \$100 - Installment Plan Fee	\$407	\$407	Same day that student registers for classes
Tuition (4 credits)	\$2,400	\$1,800	Same day that student registers for classes
Tuition (4 credits)	\$2,400	\$1,800	1 month after 1st day of the trimester
Tuition (4 credits)	\$2,400	\$1,800	2 months after 1st day of the trimester
<b>TOTAL PER TRIMESTER</b>	<b>\$7,607</b>	<b>\$5,807</b>	

## **INSTALLMENT PLAN PAYMENT SCHEDULE FOR MASTER'S PROGRAMS**

FEE TYPE	PAYMENT AMOUNT	PAYMENT AMOUNT (WITH CA DISCOUNT)	DUUE DATE
Trimester Fees: \$200 - Technology Fee \$50 - Registration Fee \$15 - SGA Fee \$42 - VTA Fee \$100 - Installment Plan Fee	\$407	\$407	Same day that student registers for classes
Tuition (3 credits)	\$2,100	\$1,575	Same day that student registers for classes
Tuition (3 credits)	\$2,100	\$1,575	1 month after 1st day of the trimester
Tuition (3 credits)	\$2,100	\$1,575	2 months after 1st day of the trimester
<b>TOTAL PER TRIMESTER</b>	<b>\$6,707</b>	<b>\$5,132</b>	

## **INSTALLMENT PLAN PAYMENT SCHEDULE FOR PH.D. IN ELECTRICAL**

### **ENGINEERING AND PH.D. IN INTERDISCIPLINARY SCIENCES PROGRAMS**

FEE TYPE	PAYMENT AMOUNT	PAYMENT AMOUNT (WITH CA DISCOUNT)	DUUE DATE
Trimester Fees: \$200 - Technology Fee \$50 - Registration Fee \$15 - SGA Fee \$42 - VTA Fee \$100 - Installment Plan Fee	\$407	\$407	Same day that student registers for classes
Tuition (3 credits)	\$3,000	\$2,250	Same day that student registers for classes
Tuition (3 credits)	\$3,000	\$2,250	1 month after 1st day of the trimester
Tuition (3 credits)	\$3,000	\$2,250	2 months after 1st day of the trimester
<b>TOTAL PER TRIMESTER</b>	<b>\$9,407</b>	<b>\$7,157</b>	

**Note:** There is a \$50 fee for switching payments if you decide to substitute an installment check with another form of payment on or before the due date of the installment, unless your installment plan has 3 installments AND you are settling your entire Installment Plan balance before the second installment due date.

## **EMPLOYER TUITION REIMBURSEMENT DEFERRED PAYMENT PLAN (ETR)**

### **1. Plan Overview**

International Technological University (ITU) has established a deferred payment plan for students who qualify for tuition reimbursement from their employer. Employer Tuition Reimbursement Deferred Payment Plan (ETR) is designed for eligible students whose employers offer reimbursement for tuition charges.

Students accepted into the plan may defer payment of the portion of their tuition reimbursement under their employer's program up to six weeks after the last date of trimester. Any portion of tuition and fees not covered under an employer tuition reimbursement plan will be due upon registration.

Students may apply for the ITU Installment Payment Plan to cover any tuition and fees not included in the ETR. Please refer to our website for all installment plan information. Failure to pay or have an installment plan arrangement in place may result in a financial hold that will prohibit release of official transcript and enrollment.

Applications for the ETR have to be submitted and approved by the Department of Finance Services each trimester. ITU has three trimesters, namely:  
(a) Spring Trimester from January through May, (b) Summer Trimester from May through September, and (c) Fall Trimester from September through January.

It is important to remember that the student is personally responsible for any and all financial obligations made to ITU, regardless of employment status or the length of time it will take the employer to process reimbursement. ITU does not bill a student's employer; the student is responsible for providing employer with the reimbursement information.

In order for the employer to receive confirmation of student grades, an official transcript request must be requested. Transcript requests are submitted by completing the Official Transcript Order Form which is available on the ITU website under Forms. The transcript will be sent to the address provided on the form after the associated transcript fee is paid.

The student is responsible for the amount deferred six weeks after the end of term, whether or not the amount is to be paid by the employer.

If the employer, for any reason, refuses to reimburse the student's tuition, the student remains responsible for the full payment of all tuition and fees to ITU. ITU reserves the right to cancel the plan, if the information provided on the application is false.

### **2. Eligibility**

The ETR is available for students working in a company with an Employee Education Assistance/Reimbursement Plan, who have a portion, or 100% of their tuition reimbursed directly to them by their employer upon successful completion of coursework.

The ETR is only applicable to ITU students who are already authorized to work legally in the U.S. Students attending ITU on an F-1 student visa are not eligible to use this plan, as their visa status requires that they show proof of ability to pay for their studies independent of any on campus employment, Curricular Practical Training (CPT), or other work authorization. On the date of application, the student must not have an outstanding account with ITU exclusive of an installment payment plan.

Students must complete and submit all required documents during the regular registration period. Applications submitted during the late registration period will be subject to an additional late processing fee.

Maximum deferral amount allowed for the calendar year should not be greater than the annual maximum limit reimbursable by the employer. There is no prepayment penalty.

### **3. Process**

- i. Visit <http://itu.edu/regulations/ETR>.
- ii. Submit completed Employer Tuition Reimbursement Deferred Payment Plan Application Form and Statement of Financial Liability within ITU's regular registration period.
- iii. Along with the completed forms in #2, student must also provide a letter from the employer's Human Resources department confirming current employment, a copy of the student's employer education assistance/reimbursement plan, and check or cash to pay the non-refundable \$50 ETR processing fee.
- iv. ETR applications submitted during the late registration period (See the University Calendar) will be assessed an additional late processing fee of \$50.
- v. A new ETR application and ETR Statement of Financial Liability must be submitted each trimester.
- vi. Submit the completed application form along with the \$50 nonrefundable ETR processing fee and proof of employment to ITU, Department of Finance Services, Accounts Receivable by mail at 2010 El Camino Real, #852, Santa Clara, CA 95050

vii. For the most updated information, please visit **they do not plan to attend.**

<http://itu.edu/regulations/ETR>

## **DBA INSTALLMENT PLAN FOR DOMESTIC STUDENTS**

This installment plan is only offered for domestic students enrolled in the Doctorate In Business Administration degree program. There will be a one-time down payment of \$3,500 followed by 35 monthly payments of \$1,000 each. The first installment payment is due by September 15th of the student's first trimester at ITU. Subsequent monthly installment payments are due by the 15th of each following month.

To enroll into the installment plan, the student must sign an installment plan promissory note provided by the university, in addition to paying a \$500 non-refundable Payment Plan Administrative Fee with the first installment payment. Please contact the Department of Finance Services via <https://support.itu.edu> for more information.

To qualify for the DBA installment plan, the student needs to:

1. Provide proof of income demonstrating ability to submit payments in accordance to the installment plan (such as a pay stub).
2. Maintain good credit standing with the university (no bounced check record, or carry any outstanding balances outside of the payment plan).

For example, a student entering as a Fall 2020 student will make his/her first tuition installment payment of \$4,000 by September 15, 2020, and continue to make the monthly installment payments of \$1,000 each on the 15th of each following month until July 15, 2023. Total payment over the three years will be \$38,000.

## **NON-PAYMENT POLICY**

Once students register for courses, they must either (a) pay tuition in full, or (b) apply for an ITU Payment Plan. Failure to do so will result in a financial hold being placed on the student's account, restricting the student's ability to add and drop courses on MyITU or to request official transcripts. The financial hold is automatically removed from the student's account once full payment is made.

A Late Payment Fee will be applied one (1) month after the first day of the trimester if there is an outstanding balance on the student account and the student has not signed up for an installment plan.

ITU reserves the right to drop courses and terminate students due to nonpayment of tuition and fees, **but it is the student's responsibility to drop any courses**

## **REFUND POLICY**

1. Students will be given a 100% refund if a class is cancelled by the University.
2. Refunds are calculated based on the following:
  - a. The time and date the class was dropped by the student on [my.itu.edu/](http://my.itu.edu/), or
  - b. The time and date the student requested a class to be dropped by the Department of the Registrar on their behalf, if the student was unable to drop the class by themselves on [my.itu.edu/](http://my.itu.edu/)
3. Depending on the original form of payment, the following refund methods will be used:
  - a. Online credit card payments will be refunded back to the same credit card account. In the event we are unable to refund back to the credit card, a refund check will be issued.
  - b. Cash, Check, Cashier's check, E-check, Traveler's Check, and Money Orders will be refunded via check.
  - c. [flywire.com/pay/itu/](http://flywire.com/pay/itu/) payments will be refunded to the original bank account via [flywire.com/pay/itu/](http://flywire.com/pay/itu/).
  - d. Please allow 4 to 6 weeks of processing time.

## **ITU REFUND SCHEDULE**

CLASS DROP DATE	REFUND PERCENTAGE
Prior to the start of the trimester:	100%
During the add/drop period (ending the second Sunday from the beginning of the trimester at 11:59PM):	100%
During the third week of the trimester (ending the third Sunday from the beginning of the trimester at 11:59PM):	80%
After the third week of the trimester:	0%

## **FINANCIAL ASSISTANCE**

International Technological University does not currently participate in any federal or state financial aid programs. In order to ease the burden of a single lump sum tuition payment, the University offer payment plan options. Please refer to the

Payment Plan section for more information.

## **SCHOLARSHIPS**

International Technological University offers Merit Based Scholarships to a select number of students every trimester. Visit <http://itu.edu/admissions/financial-resources/itu-scholarship> for more Information.

## **DISCOUNTS**

Discounts are available for qualifying students. Please contact the Department of Admissions for more information regarding the CA Resident, Chamber of Commerce, Veteran, or Police/Firefighter/EMS discounts.

## **FORM 1098-T**

The Form 1098-T is used by eligible educational institutions to relay information about their students to the IRS, as required by the Taxpayer Relief Act of 1997.

Every year, ITU will automatically generate Form 1098-T for students who are either U.S. citizens or U.S. residents, or international students who fulfill the following criteria:

- a) have a valid social security number or ITIN on record with ITU;
- b) have made payments for 1098-T eligible tuition and fee charges in the reporting year.

To submit a social security number or ITIN to ITU, the student must complete a Form W-9S by providing their full legal name, current mailing address, SSN / ITIN, and student ID number. The form can be found on the IRS website at the address below:

<https://www.irs.gov/pub/irs-pdf/fw9s.pdf>

Every year, ITU will solicit Form W-9S from students who do not have an SSN or ITIN on record. In order for ITU to issue a Form 1098-T, a Form W-9S with the correct information must be received by the university by December 31<sup>st</sup> of the current reporting year.

Please do not email the Form W-9S; any forms sent via email will not be accepted. Due to highly sensitive information on the W-9S, it must be submitted to the Finance Services Department by one of the following methods:

1) Mail to:

2010 El Camino Real, #852  
Santa Clara, CA 95050, USA

or

2) Fax to:

(408) 400-2271

or

3) Submit it in person to the Department of Finance Services window at the ITU campus

## **LATE FORM W-9S SUBMISSIONS**

The deadline for universities to issue Form 1098-Ts is January 31<sup>st</sup> of the year following the reporting year. The IRS assess penalties to universities for every late Form 1098-T submission. While ITU will honor late requests and issue a Form 1098-T past the IRS deadline, ITU will assess a \$50 late Form 1098-T request fee to offset the IRS penalty. Any initial Form W-9S submitted after December 31<sup>st</sup> of the calendar year requested is considered a late request, and will have this fee assessed.

## ACADEMIC INFORMATION

### REGISTRATION

The registration period for each trimester begins at a minimum of six weeks prior to the first day of the trimester and concludes on the day before the start of the trimester. A student is considered enrolled in the University if registered for a minimum of one credit-bearing course. Students enroll in classes through the MyITU portal, which is accessible at <https://my.itu.edu/ics>

### LATE REGISTRATION

Late registration occurs during the first two weeks of the trimester. A late registration fee is applied if the student has not registered for at least one credit-bearing course during the registration period.

### ADDING AND DROPPING COURSES

Students have an opportunity to adjust their course schedules without penalty as long as they do so during the Add/Drop period. The Add/Drop period begins with the first day of the respective trimester and concludes at 11:59 p.m. (PST) of the second Sunday following the first day of the trimester.

#### Nugget registration:

Students may use a nugget course to achieve full-time status (9 units):

1. Students must register for nugget courses during the published Add/Drop period, and add the later sessions via the Nugget Add/Drop Form on the Registrar's website.
2. Students may drop the nugget course during the published Add/Drop period for the first short-term session. F-1 students must maintain 9 credits of coursework during the term unless they receive a waiver for a reduced course load.
3. Drops for the second and third sessions may occur during the first five calendar days; by the second week of the second and third sessions, a grade of "W" will be recorded on students' academic transcript. Refer to the Withdrawal Policy.

### WITHDRAWALS

The university withdrawal period runs from the Monday following the end of the Add/Drop period through 11:59 p.m. (PST) of the Sunday that concludes the 9th week of the trimester. Dropping

a course during the withdrawal period results in a grade of W (Withdrawn).

Dropping a course after the conclusion of the university withdrawal period will result in a grade of F (Fail) or NP (No Pass). Dropping a course after the last day of the class is not permissible.

See Attendance Policy for Unauthorized Withdrawals (UW) in the Academic Policies section.

#### Withdrawal from Nugget Courses:

Students who are enrolled in a nugget course may drop the course during the first week of the course offering for that session. The drop will result in complete removal of the course from the official academic transcript. Students who need to drop the nugget course beginning the second week of that session, students, will receive a grade of "W" (withdrawal) for the course. Visit the Registrar's website for guidance and instructions to withdraw from a nugget course beginning the second week of the nugget course offering.

*Note: Refer to the Refund Policy under Financial Information for applicable dates and deadlines.*

### COURSE CANCELLATION

Courses with enrollment of less than 10 Students by the first day of the trimester, are subject to cancellation.

### AUDITING COURSES

Auditing a course is an option that allows the student to sit in on the course without receiving academic credit or a grade. The student is not required to complete course assignments, though he or she may do so with the permission of the instructor. A grade of AUD (Audit) is assigned to the course and recorded on the academic record. Courses taken for Audit do not apply toward any academic degree, and do not count as part of a student's course-load. The tuition for an audited course is 50% of the tuition for a credit bearing course. Requests for auditing a course require approval of the instructor and must be made before the end of the Add/Drop period.

### COURSE LOAD

Graduate students may enroll in a maximum of 12 units, while baccalaureate students may enroll in a maximum of 15 units. Students requesting additional units beyond their maximum allotment may meet with their advisor to obtain permission to exceed this cap. An approved *Additional Unit Authorization Form* must be submitted to the Office of the Registrar prior to the end of the Schedule Adjustment Period.

## **ONLINE COURSES**

This policy applies, beginning Spring 2017, to all newly admitted degree seeking students. In addition, the cap referred to in the policy requires that current students may not register for additional online courses if by so doing they will reach the 50% limit.

## **ONLINE COURSE LIMIT**

Degree seeking ITU students may take online courses, subject to the requirements of their program and immigration status.

Online course credit hours must constitute less than 50% of total credits counted toward degree completion. ITU's undergraduate completion programs typically consist of 60 credit hours or 20 courses and Master's programs typically consist of 36 credit hours or 12 courses. Therefore, no more than five 3 credit hour courses may be taken online, out of a total of 12 courses.

## **DECLARING OR CHANGING A CONCENTRATION**

Concentrations may be declared, starting at the point of admissions. If a student does not declare a concentration during the admissions process, the student will be enrolled in the general degree program.

Students may add or change their concentration at any point before the completion of 19 credit hours. Any approved transfer credit will be counted towards the 19 credit hours. Requests to declare or change concentrations must be made by the first day of the trimester in which the student will attempt the 20th credit hour in order to be considered.

If a student has declared a concentration and does not complete the required concentration courses by graduation, the student will graduate with the general degree, with no concentration. Concentrations will only appear on the transcript, and not on the diploma.

## **CREDIT MEASUREMENTS**

Academic credit hours are measured in terms of credit hours. This is a listing of how Academic credit hours are measured:

- 1 credit hour = 1 trimester term hour
- 1 trimester credit hour = 15 hours of classroom lectures/30 laboratory hours/45 practicum hours

Undergraduate students must enroll in 12.0 credit hours to be considered as full-time students, while Graduate students must enroll in 9.0 credit hours to be considered full-time.

## **Grading System for Graduate Degrees**

GRADE	INTERPRETATION
A+, A, A-	4.0, 4.0, 3.7 Excellent
B+, B, B-	3.3, 3.0, 2.7 Good
C+, C, C-	2.3, 2.0, 1.7 Fair
D+, D, D-	1.3, 1.0, 0.7 Failed. Credit hours will be included in computing GPA, but will not be used toward satisfaction of unit requirements for the degree.
F	0.0 Failed. Credit hours will be included in computing GPA, but will not be used toward satisfaction of unit requirements for the degree.
P	Pass. Equivalent to a C- or better; not included in computing GPA.
NP	No pass. Equivalent to below a C-; not included in computing GPA.
AUD	Audited the class. Credit hours will not be calculated in computing GPA.
I	Incomplete coursework due to circumstances beyond the student's control, but of passing quality; not included in computing GPA.
WIP	Work in Progress; final grade to be assigned upon completion of entire course. Credit hours not included in computing GPA.
W	Withdrawn. Credit hours not included in computing GPA.
UW	0.0 Failed/Unauthorized Withdrawal. Credit hours will be included in computing GPA, but will not be used toward satisfaction of credit hour requirements for the degree.

## **GRADING SYSTEM FOR UNDERGRADUATE DEGREES**

GRADE	INTERPRETATION
A+, A, A-	4.0, 4.0, 3.7 Excellent
B+, B, B-	3.3, 3.0, 2.7 Good
C+, C, C-	2.3, 2.0, 1.7 Fair
D+, D	1.3, 1.0 Passing
D-	0.7 Failed. Credit hours will be included in computing GPA, but will not be used toward satisfaction of unit requirements for the degree.
F	0.0 Failed. Credit hours will be included in computing GPA, but will not be used toward satisfaction of unit requirements for the degree.
P	Pass. Equivalent to a C- or better; not included in computing GPA.
NP	No pass. Equivalent to below a C-; not included in computing GPA.
AUD	Audited the class. Credit hours will not be calculated in computing GPA.
I	Incomplete coursework due to circumstances beyond the student's control, but of passing quality; not included in computing GPA.
WIP	Work in Progress; final grade to be assigned upon completion of entire course. Credit hours not included in computing GPA.
W	Withdrawn. Credit hours not included in computing GPA.
UW	0.0 Failed/Unauthorized Withdrawal. Credit hours will be included in computing GPA, but will not be used toward satisfaction of credit hour requirements for the degree.

Discontinued Grades, as of Fall 2015:  
R – Replaced original grade when course was

repeated.

EXL – Original grade replaced and excluded.

X – Students did not complete course or officially withdraw.

NR – No Record

Discontinued Grades will not be included in computing GPA.

## **GRADE POINT AVERAGE REQUIREMENT FOR GRADUATION**

The following statement applies to the degree program requirements for each program starting in the 2016-2017 catalog.

A minimum 3.0 cumulative GPA is required for granting of the Master's and Doctoral degree, while a 2.0 cumulative GPA is required for undergraduate students.

## **GRADE POINT AVERAGE (GPA)**

GPA is calculated by dividing the total amount of grade points by the total amount of credit hours attempted.

Only courses in which a graduate student has earned at least a grade of C- or P are counted towards the master's degree and courses in which an undergraduate student has earned at least a D or P are counted toward the undergraduate degree. All registered credit hours are counted as attempted credit hours, and all grades except P, NP, I, AUD, WIP, W, and UW are used in GPA computation. All courses require letter grades, except those specifically designated otherwise.

## **GRADE CHANGES**

Requests for grade changes must be made no later than 30 days after the first date of the trimester following the trimester in which the course was taken.

Grade change requests will only be considered if the student believes the assigned grade is incorrect due to a clerical, calculation, or other technical error.

Grade change requests that contest the instructor's judgment regarding the academic quality of the student's work or achievement will not be considered. Grade change requests that are based solely on the student's desire to have a better grade will not be considered. Grade change requests that include coursework submitted after the course has concluded will not be considered.

## **REPEATING COURSES**

A course with an earned grade of B-, C+, C, C-, D+, D, D-, F, NP, and UW may be repeated for a maximum of two (2) times. A withdrawn (W) course is not counted as a repeated course. Repeating

a course is not allowed for courses where an Incomplete (I) grade has been assigned.

Earned course credit will be awarded only once. Grades assigned at each attempt are permanently recorded on the student's transcript and the term (trimester) GPA will not be modified. The highest grade earned will be used in the cumulative GPA calculation.

## **FINAL GRADES**

Grades will be made available on the MyITU portal following submission by the instructor.

## **TRANSCRIPTS**

A record of each student's academic work at ITU is retained permanently by the Office of the University Registrar. For more information on how to request an official transcript and applicable transcript fees, visit the ITU Office of the University Registrar webpage.

## **TIME LIMITS FOR DEGREE COMPLETION**

All candidates for undergraduate's degrees must complete all matriculation requirements within eight calendar years and candidates for master's degrees must complete all the matriculation requirements within six calendar years after initial registration at ITU. See Doctoral program policy for doctoral degree completion time limits.

## **GRADUATION**

Each candidate for a bachelor's or master's degree should submit the Petition to Graduate form along with a Preliminary Checklist signed by an Academic Advisor and deliver to the Office of the University Registrar prior to the start of their final trimester.

## **EXPERIENTIAL LEARNING**

The university does not award credit for prior experiential learning.

## **TRANSFERABILITY OF CREDIT HOURS**

The transferability of credit hours earned is at the sole discretion of the receiving institution.

## **CLASS SIZE LIMIT**

Classes are limited to 48 students per weekday course, and 75 students per weekend course.

## ACADEMIC POLICIES

### FERPA POLICY

International Technological University (ITU) is committed to meeting the provisions established in the Family Educational Rights and Privacy Act (FERPA), which protects the rights of students who are enrolled or who were previously enrolled at the University. The Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

Please contact the Office of the University Registrar for additional information at [Registrar@itu.edu](mailto:Registrar@itu.edu).

### ACADEMIC PROBATION AND EXPULSION POLICY

ITU exercises a “three strikes” policy when it comes to academic probation, suspension, and expulsion.

#### Undergraduate Students Academic Probation and Expulsion Policy:

##### • Strike 1 – Probation I

A student whose cumulative GPA is below 2.00 will be placed on academic probation the following trimester. A hold will be placed on the student's record and the student MUST meet with their academic advisor before they are allowed to register for the next trimester. A student on academic probation is not considered to be in “good standing” and has therefore lost the following privileges:

- o Applying for on-campus jobs, including TA positions
- o Applying and participating in internship
- o Receiving an ITU scholarship
- o Running for student government
- o A student on academic probation must earn a CGPA above 2.00 the following trimester in order to return their academic status to “good standing.”

##### • Strike 2 – Probation II

Earning a cumulative GPA that falls below 2.00 for a second time will result in Probation II. A hold will be placed on the student's record and the student MUST meet with their academic advisor before they are allowed to register for the next trimester. Probation II acts as a final warning before Expulsion.

##### • Strike 3 – Expulsion

If a student earns a cumulative GPA that falls below 2.00 for a third time, the student will be expelled from the University. Once expelled, the student may not reapply for admission to the University for a period of one year.

#### Graduate Students Academic Probation and Expulsion Policy:

##### • Strike 1 – Probation I

A student whose cumulative GPA is below 3.00 will be placed on academic probation the following trimester. A hold will be placed on the student's record and the student MUST meet with their academic advisor before they are allowed to register for the next trimester. A student on academic probation is not considered to be in “good standing” and has therefore lost the following privileges:

- o Applying for on-campus jobs, including TA positions
- o Applying and participating in internship
- o Receiving an ITU scholarship
- o Running for student government
- o A student on academic probation must earn a CGPA above 3.00 the following trimester in order to return their academic status to “good standing.”

##### • Strike 2 – Probation II

Earning a cumulative GPA that falls below 3.00 for a second time will result in Probation II. A hold will be placed on the student's record and the student MUST meet with their academic advisor before they are allowed to register for the next trimester. Probation II acts as a final warning before Expulsion.

##### • Strike 3 – Expulsion

If a student earns a cumulative GPA that falls below 3.00 for a third time, the student will be expelled from the University. Once expelled, the student may not reapply for admission to the University for a period of one year.

### ATTENDANCE AND PARTICIPATION POLICY

All on-campus courses are held at ITU, 3120 Scott Blvd., Santa Clara, CA 95054. Attendance is mandatory for all courses at ITU. The university requires all of its students to attend, fully participate, and be engaged in all of the courses in which they are enrolled each term.

For online courses, students' regular participation online will qualify as “attendance.” Students who miss more than 20% of required attendance will be administratively withdrawn from the course and receive a grade of unauthorized withdrawal (UW). A grade of UW is calculated as an F grade in the grade point average calculation.

## **CREDIT HOUR POLICY**

Except as provided in Federal Regulation 34 CFR 668.8(k) and (l), a credit hour is an amount of work represented by intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or the equivalent amount of work over a different amount of time; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practice, studio work, and other academic work leading to the award of credit hours.

ITU has adopted the United States Department of Education requirements for “courses offered entirely online and without any required face-to-face class meetings.”

## **FINAL EXAMINATIONS POLICY**

All classes conducted at the ITU main campus have a mandatory in-class final examination or presentation.

## **SPECIAL TOPICS COURSES FOR BACHELOR'S AND MASTER'S PROGRAMS**

Special topics courses cover subjects not currently contained in the curriculum, but are designed to address especially relevant trends or developments related to the discipline.

While special topics courses may eventually become part of the curriculum, they are intended to be temporary in nature. Consequently, they cannot be required as a core or concentration course, but may be included as an elective for any program.

The specific topic of the course should be offered for one trimester only and will use 488 for Bachelor's and 688 for Master's as the designated course number across all departments.

## **INCOMPLETE GRADE POLICY**

Incomplete grade must be student initiated.

An Incomplete “I” is a temporary grade which may be given at the instructor’s discretion to a student when illness, unanticipated extraordinary circumstances, or other reasons clearly beyond the control of the student prevent completion of course requirements by the end of the term.

Incomplete grades may be given only in the following circumstances:

1. The student's work to date is passing;
2. Attendance has been satisfactory through at least 50% of the term; an illness or other extenuating circumstance legitimately prevents completion of required work by the due date;
3. Required work may be reasonably completed in time frame agreed upon by the instructor and the student no later than the end of the following trimester;
4. The incomplete is not given as a substitute for a failing grade;
5. The incomplete is not based solely on a student's failure to complete work or as a means of raising his or her grade by doing additional work after the grade report time frame;
6. The student initiates the request for the incomplete grade before the last day of the class,
7. The instructor and the student submit a Petition for Incomplete Grade form before the last day of the class
8. In other circumstances, the appropriate grade must be assigned. A failing grade and last date of attendance should be recorded for students who cease attending class without authorization. Students who are unable to complete a course and who do not meet these circumstances should consider dropping course.
9. The following provisions for Incomplete grades apply:
10. It is in the student's best interest that incomplete grades are made up by the end of the following academic term. Incomplete grades must be made up and final grades submitted no later than the last day of the subsequent term.
11. An Incomplete grade may not be considered passing for purposes of determining academic standing.
12. An Incomplete grade may not be considered for a student in their last term of attendance.
13. Students who have an incomplete grade and who do not submit complete outstanding coursework by the end of the subsequent academic term, will not be eligible for to apply for internship; a part-time or full-time internship, regardless of their cumulative GPA.
14. The Incomplete grade counts toward the student's attempted credit hours, but is ignored in the calculation of the student's GPA.
15. The Incomplete grade is expunged from the academic record and the final permanent letter grade is recorded when the final grade is submitted via a Grade Change form.
16. The Incomplete grade is converted to an F, Failing grade, if the student does not submit coursework according to the agreed deadline documented on the Petition for Incomplete form.

17. The Incomplete grade does not apply to courses such as Capstone, Independent Study, Thesis, Internship, etc.

## **INDEPENDENT STUDY POLICY PURPOSE**

Independent Study allows students to explore academic areas of special interest not provided in the existing curriculum. It is carried out under the guidance of a member of the faculty. Students are limited to 12.0 credit hours towards their Bachelor's program, 3.0 credit hours of Independent Study toward their Master's program and 6.0 credit hours towards their Doctoral program and may not take more than one Independent Study in a single trimester.

## **ELIGIBILITY**

Independent Study is available to students who have completed a minimum of 12.0 credit hours in the Undergraduate program and 9.0 credit hours in the Master's program and be in good academic standing. It must be taken within the student's degree program.

## **COURSE**

The Independent Study course is offered as variable credit within each degree program and area of study. It carries a maximum of 3 credit hours for students enrolled in the Bachelor's or Master's programs and 6 credit hours for students enrolled in a Doctoral program per trimester. The course number 489 is used across all departments for Bachelor's, 689 for Master's and 891 for Doctoral and uses the appropriate area of study subject code.

## **GRADING**

Independent Study is graded based on the standard ITU letter grade scale A-F (not P/NP).

## **CONTRACTS**

For all Independent Study programs an Independent Study Contract Request Form must be completed and approved by the supervising faculty and the Department Chair. The approved contract is submitted to the Office of the University Registrar for processing. The student's contract must:

- Present an outline of proposed study, which indicates an amount of work equivalent to the lecture and study 147 time devoted to a standard course. This equates to a minimum of 15 hours per 1 trimester credit hour. The proposal

must describe the educational value for the student's total program of study, the specific objectives, and the justification for enrolling in Independent Study.

- Provide a schedule for meeting with the instructor, for completing assignments/progress reports, for the submission of the final paper or project, and for the criteria used to assign a grade (including specific values if the grade will be based on more than the final paper or project). A minimum of weekly conferences with the supervising instructor is expected, generally on campus. Other arrangements may be made, provided the work may be appropriately supervised.
- Show preparation and competence to do independent work and to address the proposed topic.

## **LEAVE OF ABSENCE POLICIES**

### **1. One-Trimester Stop-out**

With certain restrictions and exceptions, matriculated students may stop-out from ITU for one trimester in a calendar year and maintain his or her continuing student status. Continuing status includes the maintenance of catalog year for graduation and priority registration privilege. Students who do not continue their studies after a one-trimester absence will be withdrawn from ITU. This section only applies to students in good academic standing. This section does not apply to newly admitted students who have not earned any credit hours at ITU. This section does not apply to F-1 International Students who were issued Forms I-20 by ITU.

### **2. Personal Leave of Absence**

ITU recognizes that a student might find it necessary to interrupt his or her progress toward a degree for various reasons such as medical, family, or other personal causes. To obtain an authorized break from ITU, a personal leave of absence application must be filed with and approved by the Office of the University Registrar. Applicants must indicate in which trimester he or she will continue. The deadline to file the application is the first day of the trimester in which a student would like to begin the personal leave. Upon return from the approved personal leave, the students will retain his or her continuing status, which includes the maintenance of catalog year for graduation and priority registration privilege. However, if the personal leave of absence lasts for more than three (3) trimesters, the students' catalog year will be automatically changed to the academic year to which the students return. The Office of the University Registrar

does not extend an approved personal leave of absence. A new personal leave of absence application is required if a student seeks to return in a later trimester.

Failure to resume studies in the trimester indicated in the application will result in being withdrawn by ITU. Students who wish to continue their studies after being administratively withdrawn must reapply with the Office of Admissions.

This section only applies to students in good academic standing. Students are advised that they should pay attention to the time limit allowed to complete their degrees.

3. **Restrictions on F-1 International Students:** Students on F-1 visas should seek advice from their International Student Advisors before filing for a personal leave of absence. The U.S. Federal Immigration Law and Regulation supersede the foregoing policy if any inconsistency arises. The final approval decision is at the discretion of the ITU International Student Office.

Current degree-seeking ITU students are not eligible to register as Open Campus students.

## **OPEN CAMPUS POLICY**

An Open Campus student is a non-degree seeking student who is enrolled in courses for a particular trimester, but not yet admitted into any degree program.

Such a student may enroll in any undergraduate's level (numbered 300-499) or master's level (numbered 500-699) course in any discipline at ITU, except for internship, capstone, independent study or thesis courses. An Open Campus student may not enroll in a doctoral level course without special approval from the relevant Department Chair.

There is a 9 credit hour maximum per trimester. If a student decides to apply to an ITU Master's program that student may only apply to transfer a maximum of nine (9) credit hours earned under Open Campus towards a degree program.

Open Campus students must adhere to any and all university policies and the Student Code of Conduct. Open Campus students are subject to the same tuition and fees, as well as refund schedule, as all other students, with the exception of the health insurance premium. Access to university facilities, services, and resources will be available. However, an Open Campus student cannot hold a leadership role in a student organization at ITU.

Current degree-seeking ITU students are not eligible to register as Open Campus students.

## **INTERNSHIP POLICY**

### **PURPOSE**

Hands-on experience and skill development is a key component of ITU's pedagogy. We recognize how important internships are in transferring course theory, concepts, and skills from a graduate program to a career in the student's field of study. For this reason, we are committed to linking the classroom with relevant industry experience. As affirmed by the university's Academic Leadership Council (ALC), ITU requires students to participate in an internship (one credit hour for part-time or three credit hours for full-time for 15 weeks). Students who have a late application and late start and complete 10 weeks will earn 2 Credits for full-time and 2/3 credits for part-time. Students who participate in a 5 weeks internship will earn 1 credit for full-time and 1/3 credit for part-time. Although only one (1) credit is required for master degree seeking students and three (3) credits for undergraduate students, students can participate and attempt up to a maximum of 9 credit hours per degree) as a core part of the curriculum for all of ITU's master degree programs. NP grades count as part of the 9 credits attempted.

Internships are managed through enrollment in INT 593 for graduate students and INT 493 for undergraduate students, a course that may be taken for a maximum of nine (9) attempted credit hours over the course of an academic program. ITU reviews each internship request on an individual basis to ensure that it is consistent with the student's coursework and academic policies. For ITU students in F-1 international student status, the internship request must also meet the standards found in the U.S. Code of Federal Regulations – 8 CFR § 214.2(f)(10) (i).

ITU's internship eligibility requirements, academic components and expectations, procedures and due dates, and conditions are presented below.

### **ELIGIBILITY REQUIREMENTS**

The following requirements apply to students who wish to participate in ITU's internship program:

- **Admission/Enrollment** – Students must be admitted to one of ITU's graduate programs. \*F1 students need to enroll in a full course load of a minimum of nine credit hours for master degree students and twelve (12) credit hours for undergraduate students per trimester. (Note: See exception below).
- **INT 593 or INT 493 series enrollment** – Students must enroll in INT 593 or INT 493 in order to have an internship. This course may be part of the full-time course load. Internships will not be approved as any other course at ITU, including independent study or special study courses. To continue an existing internship, students must enroll in INT 593 or INT 493 and follow the procedures listed here for each new trimester.

- Students currently employed (not F-1 Visa holders) can participate in a part-time (1 credit) internship per trimester for a maximum of 9 internship credits per degree. The internship will be within the same company student is employed with if they can participate in a NEW project that it is neither within their current position nor department. Project needs to be agreed upon by company, Human resources and/or supervisor as well as the university, ITU.
- Tuition/Fees - Students will not be approved for or begin an internship until all past tuition and fees have been paid in full.
- GPA - Graduate students must maintain a minimum cumulative GPA of 3.0 and passing grades in INT 593 to continue participating in internship. Undergraduate students must maintain a minimum cumulative GPA of 2.0 and passing grade in INT 493 to continue participating in internship.
- Internship relevance - Students must show that the requested internship is relevant to their field of study and that the internship provider has extended a formal offer that is consistent with the procedure below.
- Internship providers - Students may not have more than one internship provider at a time.  
\*All international students need to check with their immigration lawyer for eligibility to take part on internship.

## **ACADEMIC COMPONENTS AND EXPECTATIONS**

All internships at ITU require enrollment in INT 593 or INT 493, Internship. This academic class is taken for one credit hour with part-time internships (up to 20 hours per week for 15 weeks, 2/3 credits for 10 weeks, or 1/3 credit for 5 weeks) or three credit hours with fulltime internships (21 to 40 hours per week not exceeding 40 hours per week for 15 weeks, 2 credits for 10 weeks, or 1 credit for 5 weeks). In order to earn a passing grade, students must directly submit assignments listed in their course syllabus to their faculty member through EMS, and include: clear identification of their name, Student ID number, the graduate program, the internship title, the internship provider's name, and the internship supervisor's name.

## **CONDITIONS FOR ALL STUDENTS**

To ensure compliance with ITU's policies, the following conditions apply to all, new and continuing students attending ITU:

- First time internships - Internships for the first time with ITU will be limited to a part-time internship. An exception will be allowed for students who can demonstrate a prior successful internship or training experience related to a degree they earned in the U.S. Evidence of such an experience may include an academic transcript showing a passing grade in an internship course, a report from the institution's internship program showing satisfactory

- performance, and/or a letter of recommendation from an employer or other evidence that the student was authorized to work for during a period of Optional Practical Training.
- Continuous enrollment/attendance - If the internship provider ends the agreement, the student will not be permitted to continue with the internship. Or if an \*F1 student drops below full-time enrollment (Note: See exception below) will not be permitted to continue with the internship. Undergraduate students do not qualify to participate in internship during their first trimester at ITU.
- Start/End dates - As mentioned above, internships are approved only in conjunction with enrollment in INT 593 or INT 493. For this reason, internships cannot begin sooner than the trimester start date and must end by the trimester end date. No part of the internship may take place during break periods between trimesters.
- Grade Point Average (GPA) requirements - Graduate Students must maintain a minimum 3.0 cumulative GPA in their program at ITU to remain eligible for an internship. Once official grades have been posted for the prior trimester, any student who holds a cumulative GPA below 3.0 will lose all internship eligibility (i.e., both full-time and part-time), including eligibility for the trimester in progress.
- Students who maintain a cumulative GPA of 3.0 or higher once final grades have been posted and has earned a term GPA below 3.0 will only be eligible to request a part-time internship.
- Undergraduate Students must maintain a minimum 2.0 cumulative GPA in their program at ITU to remain eligible for an internship. Once official grades have been posted for the prior trimester, any student who holds a cumulative GPA below 2.0 will lose all internship eligibility (i.e., both full-time and part-time), including eligibility for the trimester in progress.
- Students who maintain a cumulative GPA of 2.0 or higher once final grades have been posted and has earned a term GPA below 2.0 will only be eligible to request a part-time internship if they had full-time the previous trimester.
- Students who had part-time will lose all internship.
- Students who have an incomplete grade and wish to apply for an internship must submit all outstanding work by the deadline to apply for internship. The final grade must be posted prior to the start of the internship. GPA requirements will apply.
- Students who have an incomplete grade and who do not submit completed outstanding coursework by the end of the subsequent academic term, will not be eligible to apply for internship (part-time or full-time), regardless

of their cumulative GPA. (Refer to Incomplete grade policy).

Graduate students whose term GPA for the most recent trimester is 3.0 or higher, but cumulative GPA remains below 3.0, will not be eligible for internship.

*Note: coursework taken at another institution will not be considered in determining eligibility for an internship in an ITU program.*

**Academic performance requirements (INT 593)**

- A student who is participating in a Full-time internship and receives a grade of "NP" (no pass) in INT 593 will be reduced to part-time internship. If a second grade of "NP" is received in INT 593 or INT 493, the internship will be cancelled and the student will be ineligible for future internships at ITU. If a student is participating in part-time internship and receives a grade of "NP" in INT 593 or INT 493, the student will be ineligible for future internship at ITU.

**Maximum internship credit hours** - Students are limited to 9 total attempted credit hours for INT 593. For each part-time internship (up to 20 hours per week for 15 weeks), one credit of INT 593 will be used. \*For each part-time internship (up to 20 hours per week for 10 weeks), 2/3 credits of INT 593 will be used. \*For each part-time internship (up to 20 hours per week for 5 weeks), 1/3 credits of INT 593 will be used. For each full-time internship (21 to 40 hours per week for 15 weeks), three credits of INT 593 will be used. \*For each full-time internship (21 to 40 hours per week for 10 weeks), two credits of INT 593 will be used. \* For each full-time internship (21 to 40 hours per week for 5 weeks), one credits of INT 593 will be used. This limit applies to both new and continuing students. A change in programs or interruption of studies will not reset this limit.

\* Note: 10 weeks internships and 5 weeks internships start after the first 5 weeks or first 10 weeks, respectively, of the term and have end date as the last day of the term. This does not apply for change of internship provider.

**Change of internship provider** - ITU recognizes that unforeseen circumstances may require the change of an internship provider. To allow completion of INT 593, students will be allowed to change their internship provider once per trimester after the add/drop period and the Friday of the 8<sup>th</sup> week of the term. A second change of internship request submitted in the same trimester will not be allowed. Students should not change internship until the change of provider has been approved by ITU. If student changes provider before approval, internship change will be denied and student will receive a "NP" grade.

A student may not request a change of internship authorization level (i.e. part-time to full-time or full-time to part-time) during the trimester in progress unless the request is the result of an adjustment of eligibility based on GPA and is submitted completely on or before the add/drop deadline. Students may not change an internship provider after Friday (6:00pm) of the eighth week of the trimester. If an internship ends after the eighth week, students must check with the faculty of INT 593 in which the student is enrolled.

**ADDITIONAL CONDITIONS FOR STUDENTS ATTENDING ITU ON AN F-1 STUDENT VISA**

To ensure compliance with ITU's policies and federal regulations, the following conditions apply to all students attending ITU on F-1 student status:

- **Maintaining visa status** - If a student violates his/her status, the student's I-20 will be terminated, which will also immediately end the student's internship.
- **Eligibility for post-graduate work authorization under Optional Practical Training (OPT)** - An F-1 student who receives 12 or more months of full-time CPT is ineligible for post-graduate work authorization under Optional Practical Training (OPT). This includes any full-time CPT a student took at the same degree level at another school before transferring to ITU. However, part-time CPT is not counted towards this total and should not affect the student's eligibility for post-graduate OPT.
- **Annual Vacation** - F-1 students are allowed one vacation term, also known as a "annual vacation", after completing a full academic year of study: three consecutive trimesters of full-time enrollment. If a student wishes to take a vacation term after this point, they may reduce their enrollment to part-time (Under 9 credit hours) or take no classes during that trimester. However, if the student wishes to begin or renew an internship during that trimester, they must enroll in INT 593 or INT 493.
- **Last Term of Study** - An F-1 student who is completing a degree program in the same trimester that an internship is requested is only required to take the number of classes needed to complete the degree. However, these classes must be on-campus, as required by F-1 student visa regulations. F-1 students can submit a request for reduced course load - last trimester.
- **Exception for ITU student employees** - Students employed by ITU in a position relevant to their academic program do not require an internship/CPT, as they will gain experience in that role. These students will instead take another academic class to maintain full-time enrollment. However, F-1 students who seek to work on-campus more than the 20-hours per week during

the trimester must request a full-time internship, enroll in INT 593 for three credit hours, and obtain CPT authorization as required by their visa status.

- Volunteering, observation, and unpaid work
  - ITU will not allow an F-1 student to engage in volunteer or unpaid work for an internship provider outside of INT 593 or INT 493. Also, such action by a student before or after approved internship dates may result in an immediate loss of the internship and CPT authorization, as well as eligibility for any future internship at ITU. Such action might also be treated as a violation of the student's F-1 visa status, resulting in termination in SEVIS for "unlawful employment".

## **DOCTORAL PROGRAM POLICY**

### **ADMISSIONS REQUIREMENTS**

- Application Requirements: Doctoral applicants must submit their completed application normally 4 months prior to the start of a trimester
- Resume: Four page maximum
- Statement of purpose: A statement of purpose of approximately 1,000 words is required. This statement should address the reasons for seeking the Doctoral degree and how the doctorate will advance personal and career goals. Doctoral programs require a minimum of three years for completion. Maximum time for completion is eight years, during which the candidate works with a faculty supervisor, who is also a member of the panel before which the candidate will defend his or her dissertation.
- Admissions are highly competitive. Applicants are expected to present:
  - o A cumulative grade point average (GPA) of 3.5 or higher in a relevant, regionally accredited Master's program.
  - o Official transcripts of all undergraduate and graduate education
  - o GRE score: within 5 years prior to application to the program.
  - o Three academic or professional letters of recommendation attesting to the ability of the applicant to succeed in a Doctoral program.

### **PROGRAM REQUIREMENT:**

- 60 credit hours beyond Master's degree including
  - 30 credit hours of coursework and independent study
  - 30 credit hours of dissertation  
(All dissertation units are graded on a Pass/No Pass basis).
  - A maximum of 15 credit hours with grade of B or above may be transferred from Master's or Doctoral level courses of a regionally accredited

university, with approval of department chair.

- Successful completion of a written qualification examination is required for advancement to candidacy.
- Successful completion of an oral presentation of the Dissertation proposal.
- Successful completion of an oral comprehensive defense of the Doctoral dissertation.
- One or more articles of original work based on the dissertation research should be submitted for publication in an appropriate peer-reviewed journal, approved by the Doctoral Committee (DC).

## **PROGRAM COMPLETION**

### **Dissertation Advisor**

It is the student's responsibility to obtain consent from a faculty member in the student's major department to serve as his/ her prospective dissertation advisor as soon as the student is accepted as a Doctoral student. The department chair must approve the advisor and inform the chair of Doctoral Program Council (DPC) and the University Registrar of the approval. A Doctoral student and his/her dissertation advisor jointly develop a study plan for courses and research in a particular area, and submit it to the Department Chair for approval.

## **QUALIFICATION EXAMINATION**

The qualification exam may be taken upon successful completion of 24 credit hours. Exam grading will be on a P/NP basis, unless the specific program institutes an alternate form of grading. The qualification exam can be retaken only once. The qualification exam is in written format only. Students must select three fields, subject to approval of the Department Chair, and each field will cover at least three courses.

## **ADMISSION TO CANDIDACY**

A student who passes the qualification examination is considered advanced to candidacy. A Doctoral candidate should promptly request the dissertation advisor to form a Doctoral Committee. A Doctoral candidate is required to be registered for the dissertation research course each term until completion of the degree. If a candidate fails to maintain continuous enrollment in the dissertation research course he/she must apply for reinstatement to the program.

## **DOCTORAL COMMITTEE (DC)**

Upon the student's request, the dissertation advisor will form a DC. The DC will consist of a minimum of three and a maximum of five members, including the dissertation advisor and the Department

Chair. One member of the committee must be from another department of the University or a qualified expert from outside of the University. The dissertation advisor will serve as the chair of DC. The DC will review the proposed dissertation topic, determine any further changes, and approve the research objective.

### **COMPREHENSIVE ORAL PRESENTATION**

After completion of the preparation of the dissertation topic, a Doctoral candidate shall request an oral presentation of the proposed research. The presentation shall make evident sufficient preparation in depth and breadth for advanced research in the proposed dissertation topic. The presentation should be completed within one year after passing the written qualification examination. The presentation may be repeated only once, in whole or in part, within six months, at the discretion of the dissertation advisor.

### **DISSERTATION RESEARCH**

The period following the comprehensive oral presentation is devoted to research for the dissertation, although such research may begin before the oral presentation is completed. After the DC approves the research topic, the Doctoral candidate shall conduct the dissertation research toward the defined objective.

### **INSTITUTIONAL REVIEW BOARD (IRB)**

In addition, doctoral dissertation involving human subjects, conducted at educational institutions is required to be in compliance with federal regulations. ITU's IRB, in accordance with federal regulations, reviews all research involving human subjects for compliance with applicable regulation and other best practices. This includes the DBA research proposals, prior to the data collection stage. Candidates are urged to understand their obligations in relation to their interactions with human subjects and the IRB by reviewing the ITU IRB Handbook.

### **PUBLICATION**

One or more articles of original work based on the dissertation research should be submitted for publication in an appropriate peer-reviewed journal, approved by the DC.

### **TEACHING REQUIREMENT**

The Doctoral Candidate is expected to teach at least one course in order to demonstrate his/her

teaching ability. The teaching assignment should be completed prior to the Dissertation Defense.

### **DISSERTATION DEFENSE**

The dissertation must be made available to all members of the Doctoral Committee one-month prior to the defense. The oral defense shall include a presentation of the dissertation results. The Dissertation Defense is open to the public, but only members of the DC are entitled to vote. A unanimous vote is required for a successful defense.

### **PROGRAM COMPLETION**

At least one month before the degree is to be conferred, the candidate must submit two copies of the final version of the Dissertation to the DC, describing the research in its entirety. The dissertation will not be considered as accepted until approved by the DC and presented for publication in the appropriate academic archival repository. The University reserves the right to evaluate the undertakings and the accomplishments of the degree candidate in total, and award or withhold the degree as a result of its deliberations.

### **TIME LIMIT FOR COMPLETING DOCTORAL DEGREES**

All requirements for the Doctoral degree must be completed within eight years following acceptance into the Doctoral program.

#### **Exceptional Consideration**

Any instance not covered by the above policy will be considered as an exception. Exceptions will be presented to the DC by the relevant department chair for review. Only the DC can make decisions regarding exceptions.

### **TERMINAL MASTER'S DEGREE**

Students who are not able to complete the dissertation after completing the required number of credit hours of coursework will receive a Terminal Master's degree, if 30 credits of PhD have been successfully completed.

## INTERNATIONAL STUDENT POLICIES

### STARTING A RELATIONSHIP WITH THE INTERNATIONAL STUDENT OFFICE

All international students new to ITU must check in with the International Student Office when they arrive in the country or before they start classes. Checking in allows the International Student Office staff to make sure that the student has all of the necessary documents to start the trimester in status. Check-in for new international students normally occurs at new student orientation. Students with unforeseen circumstances, who cannot attend orientation should contact the International Student Office through ITU's ticket system, explain their situation, and arrange a time to check in during make up orientation sessions.

Students who do not check in with the International Student Office may have their SEVIS record cancelled or terminated if ISO staff cannot confirm that they are attending classes at ITU.

#### Maintaining F-1 Student Visa Status

Maintaining legal status is an active, on-going process. Students need to contact the International Student Office about personal and academic situations that might affect their status.

To remain in legal F-1 visa status, the student should follow these four steps:

1. Check in with the International Student Office.
2. Keep your passport and immigration documents valid:
  - a. I-20 must be valid at all times: Any changes to name, program or degree level must be reported to ISO so that an I-20 can be issued to reflect these changes.
  - b. If a student needs additional time to complete his/her program, extensions of the I-20 program end date (on page 1) should be requested 30 days before the program end date listed in the program study section on page 1 of the I-20.
  - c. I-94 should show class of Admissions as "F-1" and admit until "D/S" or "Duration of Status".
  - d. Passport must be valid six months into the future at all times.

Please note: A student otherwise maintaining lawful F-1 status is not at risk if s/he has an expired F-1 visa, as a valid F-1 visa stamp is needed for the sole

purpose of entering the U.S. from abroad.

3. Maintain full-time enrollment. 9 credit hours for Master's students at ITU (unless formally approved by the International Student Office and the Office of the University Registrar).
4. Report an address change by filling out the Change of Address form, within 10 days of moving.

### MAINTAINING PERSONAL IMMIGRATION AND STUDENT RECORDS

Students should keep copies of all immigration and student-related documents until they no longer have any plans to reside, work, or study in the United States.

Here is a suggested list of documents:

- Current passport
- The admissions letter and any documents showing a change of concentration, major, or program
- Diploma for each completed degree
- Any U.S. visas
- Any I-20 or DS-2019
- The most recent I-94
- Any I-797
- A sealed, official transcript for each school attended
- Receipt(s) showing payment of the I-901 SEVIS fee
- Documents related to any internship courses, such as offer letters, internship cooperative agreements, and internship class assignments
- Records of all U.S. addresses with documents proving address of residence

### COURSE LOAD INFORMATION FOR INTERNATIONAL STUDENTS

F-1 students must be registered for a full course load (9 credit hours) each trimester. There are two exceptions to this rule: being on an Annual Vacation or Reduced Course Load. Forms for these exceptions can be found here: <http://itu.edu/students>

**Reduced Course Loads:** Students may apply to the ISO for a reduced course load for certain academic difficulties, medical issues, or if they need less than a full course load to complete their final trimester. Students who are approved for a Reduced Course Load remain responsible for tuition, fees, and grading policies related to classes that began before the student submitted their request and should contact the Office of the University Registrar on these matters.

**Annual Vacation:** A student is eligible to submit a Request for Annual Vacation after they have

completed three consecutive trimesters with a full course load at ITU.

If F-1 students fail to enroll in a full course load without an approved reduced course load or trimester break, their SEVIS record may be terminated or cancelled.

### **ONLINE COURSE POLICY FOR F-1 STUDENTS**

F-1 students may only take one online course (3 credits hours) toward their minimum number of credit hours for full-time enrollment during the trimester. This policy also applies to students with other nonimmigrant visa status who are in the process of changing their visa to F-1. See Federal Regulation 8 C.F.R. § 214.2(f)(6)(i)(G)

## UNIVERSITY OFFICERS

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President and CEO

### **Dr. Gerald A. Cory**

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### **Mr. Philip Ng**

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# Course Catalog

## DEGREE PROGRAMS AND REQUIREMENTS

Departments and programs are listed alphabetically. Curriculum and courses are listed under each program.

For the most current course offerings by trimester, see the online Course Schedule.

### PREREQUISITES

Prerequisites for courses should be noted carefully; meeting these requirements is the responsibility of the student.

### COURSE NUMBERING SYSTEM

Each course is assigned an alphabetical code along with a three-digit number. The course code is defined by a descriptor for course types or programs:

- ACT (Accounting)
- AMS (Applied Mathematics)
- BIO (Bio-Management)
- BUS (Business, Non-specific)
- CEN (Computer Engineering)
- CSC (Computer Science)
- DGA (Digital Arts)
- ECE (Electrical and Computer Engineering)
- ECN (Economics)
- EEN (Electrical Engineering)
- EMG (Engineering Management)
- ERP (Enterprise Resource Planning)
- FIN (Finance)
- HCM (Health Care Management)
- HRM (Human Resource Management)
- ICS (Information Cyber Security)
- IDS (Interdisciplinary Sciences)
- INB (International Business)
- INT (Internship)
- MBN (Master of Business Administration, Thesis)
- MGT (Management)
- MIS (Information System Management)
- MKT (Marketing)
- PRE (Interdisciplinary Sciences - ITU Presents)
- SWE (Software Engineering)

The level of the course is designated by the course number:

Course Type	Number	Description
	200-499	Undergraduate Level Courses
Beginning Graduate Courses	500-599	Graduate-level courses
Internships	593	Internships courses
Advanced Graduate Courses	600-699	Graduate-level courses intended primarily for mid and upper-level graduate students.
Capstone and Thesis	690-699	Graduate-level research and/or development projects conducted on an individual or group basis.
Doctoral-Level Courses	700-899	Doctoral-level courses
Doctoral Thesis & Research	900-999	Thesis and Dissertation Research.

## DEPARTMENT OF BUSINESS ADMINISTRATION

### MISSION

In order to become a center of distinction, the Department of Business Administration strives to prepare its students and graduates with the knowledge and practical skills to serve as business and industrial leaders. We believe this aspiration is achieved through collaboration with our high-quality faculty and ongoing engagement with our communities.

### INSTITUTIONAL LEARNING OUTCOMES (ILOS)

- 1. Problem Solving:** Construct, interpret, analyze, and evaluate information and ideas derived from a multitude of sources in order to reach reasoned solutions or alternative strategies to solve problems.
- 2. Critical Thinking:** Analyze facts and information from multiple sources in order to assess the relevance and synthesize that information in order to formulate meaningful arguments and conclusions.
- 3. Communication:** Interact clearly and effectively in written and oral forms with personal and professional constituencies.
- 4. Team Work:** Operate collaboratively and respectfully as members and leaders of diverse teams and organizations.
- 5. Technical Literacy:** Work responsibly, appropriately and effectively, using technology tools to access, manage, integrate, evaluate, create and communicate information and innovation.
- 6. Research:** Identify and implement systematic methodologies for discovering, understanding, analyzing and interpreting materials, information and behaviors.
- 7. Responsibility:** Practice sound, ethical, and social responsibility in professional and personal endeavors and decision-making.

### MASTER OF BUSINESS ADMINISTRATION PROGRAM

The Business Administration program is designed as a balanced preparation for managerial careers in business. The program provides the students a solid foundation in the following concentrations MBA, Business Analytics, and Healthcare Management that will be as valuable ten years from now as it is today. The University's location in the heart of Silicon Valley provides its MBA students with exposure to the unique entrepreneurial success in this region. The MBA faculty has many years of experience in starting companies, managing corporations, directing advanced product development, and consulting for major companies. The Business program requires successful completion of 39 credit hours.

**Inbound and Outbound Exams:** Beginning Spring 2016, all new students are required to take the Inbound exam with Peregrine Academic Services. The Inbound exam is required to be taken in the first trimester attending ITU. The exam is considered a mandatory assignment in the

core overview course MGT 503 Organizational Leadership Theories. For this reason, all new students are required to take MGT 503 in their first trimester.

In addition, all new students are required to take the Outbound exam with Peregrine Academic Services. The Outbound exam will be taken in the capstone course, either MGT 690, Pitching a Business Plan to Venture Capitalists, MBN 697, Master Thesis, BUA 690 Simulation and Optimization for Business Analytics, or HCM 690 Healthcare Innovation Management Project. The Outbound exam is also a mandatory assignment in the capstone course.

The benefit of taking the Inbound exam is to test students' knowledge of business topics when they enter the Business program, while the benefit of taking the Outbound exam is to test their knowledge upon graduation. Students may include the progress made from the Inbound to the Outbound on their resume or portfolio. Exams will be taken once and the exam score will not affect the GPA or Graduation qualification. The exam score does not affect credit earned for the course. Any student who does not take the Inbound exam will be assigned a grade of Incomplete and subject to the ITU Incomplete grade policy. Any student who does not take the Outbound exam, will not be eligible for graduation. The Inbound and Outbound exams are REQUIRED and are not OPTIONAL. Information on how to take the exams will be provided in the course syllabus related to the Inbound or Outbound exam. Both Inbound and Outbound exams will have a fee which is currently \$40 per exam.

### PROGRAM LEARNING OUTCOMES (PLOs)

All PLOs are mapped to the relevant ILOs and contained within parentheses. Upon completion of this program, graduates will:

- PLO 1: Evaluate information to find solutions for business challenges using the cognitive processes of observation, reflection, analysis, conclusion and practice. [Mapped to ILO 1, 2]
- PLO 2: Illustrate effective communication in written and oral formats. [Mapped to ILO 3]
- PLO 3: Assemble teams for business projects using effective group dynamics. [Mapped to ILO 4]
- PLO 4: Evaluate and synthesize business practice by applying technical and research skills to analyze complex data, understand theories, and create hypotheses. [Mapped to ILO 5, 6]
- PLO 5: Outline and demonstrate sound ethical and socially responsible behavior. [Mapped to ILO 7]

### CAREER OPPORTUNITIES

ITU's Business Administration program can prepare a student for a career in Accounting, ERP, Finance, Healthcare Management, Human Resources, Information Systems, International Business, Management, Marketing, and Project Management. Students may work as an Accounting Manager, Business Analyst, Consultant - Strategy, Financial Analyst, CFO, Global Analyst, Healthcare Analyst, Treasurer, SAP Technical Senior Manager, SAP Business Analyst, Market Strategist, Marketing Specialist, HR Manager, Data Analyst, Marketing Manager, Product Manager, and Program Manager.

## **REQUIRED COURSES:**

- » 3 Core Courses (9 credit hours)
- » Capstone course - Project or Thesis (3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
  - ITU Presents (1 credit hour)
  - ITU Nuggets (2 credit hours)

Elective courses: 23 credit hours

Elective courses may include one or more of the following (a, b, c, d):

- (a) Internship: 1-9 credit hours (**Including 1 credit hour of required internship**).
- (b) Cross Disciplinary course: Up to 3 credit hours
- (c) Transfer Credits: Up to 9 credit hours from a graduate program of a regionally accredited university

39 Total credit hours

## **GRADE POINT AVERAGE (GPA)**

A minimum 3.0 cumulative GPA is required for granting of the Master's degree.

## **MASTER OF BUSINESS ADMINISTRATION CONCENTRATIONS**

- Business Analytics (with a STEM option)
- **Economics Business and Development (with a STEM option)**
- Enterprise Resource Planning
- Financial Analysis and Risk Management
- Global Entertainment Management
- Healthcare Management
- MBA (General)
- Management Information Systems
- Project Management

Students who will not pursue a concentration in any of the above will graduate with an MBA. In addition, they can focus on Accounting, Human Resource Management, International Business, Management, or Marketing, by completing at least 4 courses in the specific focus. The thesis topic should be on the selected focus.

Students who complete 4 courses from the following: BUA 501, 506, BUS 516, 520, 521, and MGT 569 will graduate with a Business Analysis focus.

## **MASTER OF BUSINESS ADMINISTRATION (MBA)**

The MBA provides the students a solid foundation in various business subjects. With the MBA, you can see your future as a leader and innovator at your workplace. An MBA can offer your profession the enhancement that it needs. It gives students the flexibility to modify their study according to their educational and professional interests.

## **EMPHASIS LEARNING OUTCOMES WITH NEW COMPETENCIES MODEL**

1. Define key Learning Competencies of students that graduate from the Business Degrees at ITU
  - a. Competency is: a defining capability or advantage that distinguishes a business student from other degree students (internal and external) (Oxford Dictionaries)
  - b. As defined by WSCUC, the five (5) core competencies that a student needs to develop in order to be successful at school, at work and in their lives are: Writing, Oral Communication, Quantitative Reasoning, Critical Thinking, and Information Literacy (WSCUC, 2016. Retrieved from <https://www.wscuc.org/content/big-five-addressing-core-competencies>)
  - c. According to Remake Learning, the goal of competency-based learning is to ensure that students are able to demonstrate knowledge, skills, and dispositions that are important to success in school, higher education, careers, and life (Remake Learning. Retrieved from <http://remakelearning.org/competencies/>)

2. Learning Competencies defined by the Business Department at ITU are:

- a. LC 1: Communication (spoken, and written)
- b. LC 2: Leadership (includes individual strengths, collaboration and teamwork)
- c. LC 3: Critical Thinking
- d. LC 4: Focused Knowledge

## **MBA EMPHASIS LEARNING OUTCOMES (ELOS)**

The ELOs are intended to improve student learning in the following areas: analytical skills, communication, critical thinking, ethical reasoning, global position, information technology, and the legal systems. Upon completion of the MBA, graduates will:

- ELO 1: Evaluate and apply theories for effective business practice. [Mapped to PLOs 1, 4, 5]
- ELO 2: Identify and build skills to work and communicate successfully with varied groups that motivate joint ownership of results. [Mapped to PLOs 2, 3, 4]
- ELO 3: Select, analyze, and synthesize appropriate data for problem solving and decision-making to disseminate information to key stakeholders. [Mapped to PLOs 1, 2, 3, 4]
- ELO 4: Interpret and predict global business trends in response to changing business environments and enhance organizational performance. [Mapped to PLOs 1, 2, 4, 5]
- ELO 5: Illustrate skills from numerous disciplines to transform business practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]

## MBA ELOS MAPPING TO BUSINESS PROGRAM LEARNING COMPETENCIES

Learning Competencies (LCs)	MBA ELOs
LC 1: Communication (spoken, and written)	<p>ELO 2: Identify and build skills to work and communicate successfully with varied groups that motivate joint ownership of results. [Mapped to PLOs 2, 3, 4]</p> <p>ELO 3: Select, analyze, and synthesize appropriate data for problem solving and decision-making to disseminate information to key stakeholders. [Mapped to PLOs 1, 2, 3, 4]</p>
LC 2: Leadership (includes individual strengths, and collaboration)	<p>ELO 3: Select, analyze, and synthesize appropriate data for problem solving and decision-making to disseminate information to key stakeholders. [Mapped to PLOs 1, 2, 3, 4]</p> <p>ELO 4: Interpret and predict global business trends in response to changing business environments and enhance organizational performance. [Mapped to PLOs 1, 2, 4, 5]</p> <p>ELO 5: Illustrate skills from numerous disciplines to transform business practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]</p>
LC 3: Critical Thinking	<p>ELO 3: Select, analyze, and synthesize appropriate data for problem solving and decision-making to disseminate information to key stakeholders. [Mapped to PLOs 1, 2, 3, 4]</p> <p>ELO 4: Interpret and predict global business trends in response to changing business environments and enhance organizational performance. [Mapped to PLOs 1, 2, 4, 5]</p> <p>ELO 5: Illustrate skills from numerous disciplines to transform business practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]</p>
LC 4: Focused Knowledge	<p>ELO 1: Evaluate and apply theories for effective business practice. [Mapped to PLOs 1, 4, 5]</p> <p>ELO 4: Interpret and predict global business trends in response to changing business environments and enhance organizational performance. [Mapped to PLOs 1, 2, 4, 5]</p> <p>ELO 5: Illustrate skills from numerous disciplines to transform business practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]</p>

### TRANSFER COURSES

If students pass four parts of the CPA exam, they are

eligible to apply for a transfer of 3 courses, equivalent to 9 credit hours. If students pass three parts of the CPA exam, they are eligible to apply for a transfer of 2 courses,

equivalent to 6 credit hours. If students pass two parts of the CPA exam, they are eligible to apply for a transfer of 1 course, equivalent to 3 credit hours. If students pass one part of the CPA exam, they will not be eligible to apply for transfer of any course.

### **SAP JOINT RECOGNITION AWARD**

Upon completing 3 of the following Enterprise Resource Planning courses with a grade of B or above, the student is awarded a joint recognition award from ITU and SAP University Alliances.

- ACT 603 Accounting Information Systems/ERP -  
*ITU/SAP University Alliances*
- ERP 509 Introduction to ERP Systems Using SAP -  
*ITU/SAP University Alliances*
- ERP 510 ABAP - Advanced Business Application Programming -  
*ITU/SAP University Alliances*
- ERP 511 Enterprise Portal Technology Using NetWeaver -  
*ITU/SAP University Alliances*
- ERP 512 Enterprise Procurement Processes (MM) -  
*ITU/SAP University Alliances*
- ERP 513 Sales Order Management with ERP -  
*ITU/SAP University Alliances*
- HRM 532 Managing Human Capital using SAP HCM -  
*ITU/SAP University Alliances*
- HRM 535 Human Resources and Information Technology using SAP HCM -  
*ITU/SAP University Alliances*
- MIS 545 Data Mining and Business Intelligence using SAP -  
*ITU/SAP University Alliances*
- MKT 593 Marketing with Digital Perspectives using SAP CRM -  
*ITU/SAP University Alliances*

## **MASTER OF BUSINESS ADMINISTRATION PROGRAM REQUIREMENTS**

### **REQUIRED CORE COURSES**

- MGT 503 Organizational Leadership theories
- FIN 534 Financial and Economic Analysis
- MIS 527 Technology and Operations Management: Creating value

### **RECOMMENDED COURSE:**

- MKT 551 Competitive Marketing Strategies

### **CAPSTONE COURSE**

1 Capstone course: Business Project or Thesis for a total of 3 credit hours

- MBN 697 MBA Thesis
- OR
- MGT 690 Pitching a Business Plan to Venture Capitalists

### **INTERNSHIP**

INT 593 Internship (1 Credit Hour)

- » PRE-500 ITU Presents (1/3)  
(3 courses for a total of 1 credit hour)

### **ITU NUGGET COURSES (2 CREDIT HOURS)**

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

### **ELECTIVE COURSE**

A sufficient number of Elective Courses must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

### **MBA ELECTIVE COURSES**

- ACT 500 Financial Accounting
- ACT 501 Forensic Accounting
- ACT 502 International Accounting
- ACT 504 Tax Accounting Principles
- ACT 600 Managerial Accounting
- ACT 601 Cost Accounting
- ACT 602 Intermediate Accounting
- ACT 603 Accounting Information Systems/ERP - ITU/SAP University Alliances
- ACT 604 Auditing
- BUS 500 Project Management Frameworks
- BUS 501 Strategic Planning and Portfolio Management
- BUS 502 Project Management and Leadership
- BUS 503 Project Management - Agile Approach
- BUS 504 Contract Management and Financial Planning
- BUS 509 Leading and Managing Change
- BUS 510 Regulation, Governance Ethical and Social Responsibility
- BUS 516 Principles of quality management
- BUS 517 Organization Culture and Diversity
- BUS 518 Applied Statistics
- BUS 520 Emerging technologies for product development
- BUS 521 Management of Technology and Innovation
- BUS 600 Research Methods
- BUS 688 Special Topics (1-3 credit hours)
- BUS 689 Independent Study (1-3 credit hours)
- BUS 690 Strategic Management and Business Policy
- ERP 509 Introduction to ERP Systems using SAP -  
*ITU/SAP University Alliances*
- ERP 510 ABAP - Advanced Business Application Programming - *ITU/SAP University Alliances*
- ERP 511 Enterprise Portal technology using NetWeaver -  
*ITU/SAP University Alliances*
- ERP 512 Enterprise procurement processes (MM) - *ITU/*

### **SAP University Alliances**

ERP 513 Sales order management with ERP - **ITU/SAP University Alliances**  
FIN 515 Managerial Finance  
FIN 516 Entrepreneurial Finance  
FIN 517 Financial Institutions  
FIN 518 Financial and Socially Responsible Investing  
FIN 519 Corporate Valuation  
FIN 520 Investment Management  
FIN 521 International Financial Management  
FIN 522 Behavioral Finance  
FIN 523 Macroeconomic Theory  
FIN 525 Econometrics  
FIN 526 International Economics  
FIN 604 Securities Analysis  
FIN 605 Financial Derivatives and Risk Management  
FIN 606 Corporate Finance  
FIN 607 Mergers and Acquisitions  
HRM 528 Human Resource Management  
HRM 529 Employee Training and Development  
HRM 530 Employment law for business  
HRM 532 Managing Human Capital using SAP HCM - ITU/  
SAP University Alliances  
HRM 533 Strategic compensation: issues and  
opportunities  
HRM 535 Human Resources and Information Technology  
using SAP HCM - **ITU/SAP University Alliances**  
INB 553 Fundamentals of International Business  
INB 554 International Financial Markets  
INB 556 Global Strategic Management  
INB 558 Global Marketing and Strategy  
MGT 560 Principles of Management  
MGT 561 Coaching – Changing Lives, Changing  
Organizations  
MGT 564 Principles of Public Relations  
MGT 566 Production and Operations Management  
MGT 567 Quality Control Management  
MGT 569 Strategic Operations Management  
MGT 571 Critical Thinking Strategies in Decision Making  
MGT 572 High-Technology Entrepreneurship  
MGT 573 International Management  
MGT 575 Project Management  
MGT 576 Organizational Theory  
MGT 577 Project risk management  
MGT 578 Business Communications  
MGT 579 Business Ethics  
MGT 580 Business Law  
MGT 581 Managing Emotions, Managing Self and Others  
MGT 582 Team and Group Dynamics  
MGT 583 Global Entrepreneurship and Innovation  
MGT 584 Supply Chain Management (Previously MGT  
584)  
MGT 593 Intrapreneurship – Innovation from Within  
MGT 608 Business Statistics  
MGT 611 Lean Six Sigma  
MGT 612 Advanced Project Management  
MIS 537 Management Information Systems  
MIS 538 Business Database Applications  
MIS 539 Business Telecommunications  
MIS 540 Information Resource Management  
MIS 541 Managing Global Information Systems Projects  
MIS 542 Information Systems Innovation  
MIS 543 Human-Computer Interaction  
MIS 544 Business Decision Support Systems  
MIS 545 Data Mining and Business Intelligence using SAP-  
ITU/SAP University Alliances  
MIS 546 Data Science for Business

### **MIS 547 Software Development Process Management**

MIS 548 Knowledge Management  
MKT 582 Marketing Management  
MKT 583 Entrepreneurial Marketing  
MKT 585 International Marketing  
MKT 586 Marketing Research  
MKT 587 Comparative Studies of MNC, FDI, and  
International Trade  
MKT 588 Consumer Behavior  
MKT 589 E-commerce  
MKT 590 Marketing with Social Media  
MKT 591 Advertising Strategy  
MKT 592 Supplier/Seller Management  
MKT 593 Marketing with Digital Perspectives using SAP  
CRM - ITU/SAP University Alliances  
MKT 613 Advanced Marketing

### **INTERNSHIP**

INT 593 Part-time/Full-time Internship (1/3-3 credit hours)

### **BUSINESS ANALYTICS**

Over the last few years, the field of Business Analytics has known a remarkable growth. **Business Analytics Professionals** help organizations decrease overall costs, and better support the customer and the solutions necessary to stay competitive in international economy.

International Technological University offers an MBA in Business Analytics Concentration, which prepares the students to be responsible for recognizing business needs, and to operate as a liaison between business people and technology people who know how to create solutions for business problem

### **BUSINESS ANALYTICS OFFERS FIVE AREAS OF SKILL:**

**Technical:** The technical courses offer the Business Analytics Professionals the education, proficiencies and capabilities to know what technology can do.

**Organizational / Process:** The Business Analytics Professionals will be given a chance to build up understanding and proficiencies in the fields of organizational change management, business process analysis, business process improvement, and enterprise strategy and planning.

**Practical Reasoning:** Courses in this area will develop the Business Analytics Professionals capability to efficiently conceptualize, apply, study, create, and assess the collected information.

**Administration / Management / Leadership:** The courses in these areas will discuss the understanding, proficiencies, and capabilities necessary to manage work and to encourage and support individuals and teams to complete project tasks and objectives.

**Communication:** Communication is important for the Business Analytics Professionals. The courses will consist of written and verbal practical communication, active listening and understanding, customer service, and teamwork.

The Business Analytics will prepare the students to take the following certificates: Certification of Competency in Business Analysis (CCBA), and Certified Business Analysis Professional (CBAP).

## **EMPHASIS LEARNING OUTCOMES (ELOS):**

The Business Analytics aims to help students to graduate with the ability to:

ELO 1: Identify and build skills to work and communicate successfully with varied groups that motivate joint ownership of results. [Mapped to PLOs 2, 3, 4]

ELO 2: Design systems to mechanize data collection and data mining that can deeply influence business

performance. [Mapped to PLOs 1, 4, 5]

ELO 3: Determine appropriate data analytics methodologies to support critical thinking for decision making. [Mapped to PLOs 1, 4, 5]

ELO 4: Identify situations to apply Decision Sciences practices for optimal business outcomes. [Mapped to PLOs 1, 4, 5]

ELO 5: Illustrate skills from numerous disciplines to transform business practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]

## **BUSINESS ANALYTICS ELOS MAPPING TO BUSINESS PROGRAM LEARNING COMPETENCIES**

Learning Competencies (LCs)	Business Analytics ELOs
LC 1: Communication (spoken, and written)	ELO 1: Identify and build skills to work and communicate successfully with varied groups that motivate joint ownership of results. [Mapped to PLOs 2, 3, 4]
LC 2: Leadership (includes individual strengths, and collaboration)	ELO 2: Design systems to mechanize data collection and data mining that can deeply influence business performance. [Mapped to PLOs 1, 4, 5]  ELO 3: Determine appropriate data analytics methodologies to support critical thinking for decision making. [Mapped to PLOs 1, 4, 5]  ELO 5: Illustrate skills from numerous disciplines to transform business practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]
LC 3: Critical Thinking	ELO 3: Determine appropriate data analytics methodologies to support critical thinking for decision making. [Mapped to PLOs 1, 4, 5]  ELO 4: Identify situations to apply Decision Sciences practices for optimal business outcomes. [Mapped to PLOs 1, 4, 5]  ELO 5: Illustrate skills from numerous disciplines to transform business practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]
LC 4: Focused Knowledge	ELO 2: Design systems to mechanize data collection and data mining that can deeply influence business performance. [Mapped to PLOs 1, 4, 5]  ELO 4: Identify situations to apply Decision Sciences practices for optimal business outcomes. [Mapped to PLOs 1, 4, 5]  ELO 5: Illustrate skills from numerous disciplines to transform business practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]

## BUSINESS ANALYTICS REQUIREMENTS

### REQUIRED CORE COURSES

MGT 503 Organizational Leadership theories  
FIN 534 Financial and Economic Analysis  
BUA 500 Principles of Business Analytics

### RECOMMENDED COURSE:

MKT 551 Competitive Marketing Strategies

### CAPSTONE COURSE

1 course for a total of 3 credit hours

BUA 690 Simulation and Optimization for Business Analytics

### INTERNSHIP

INT 593 Internship (1 credit hour)

### ITU PRESENTS

- » PRE-500 ITU Presents (1/3)  
(3 courses for a total of 1 credit hour)

### ITU NUGGET COURSES (2 CREDIT HOURS)

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

### BUSINESS ANALYTICS COURSES

Business Analytics Professionals are required to use data, competencies, and capabilities that meet all areas of proficiency when performing their primary job duties. Business Analytics courses are presented as inter-related courses that meet all areas of proficiency.

**Students are required to take at least four (4) Business Analytics (BUA) elective courses in order to graduate with a Business Analytics concentration.**

### BUSINESS ANALYTICS ELECTIVE COURSES

BUA 501 Quantitative Analysis  
BUA 502 Data Analysis  
BUA 503 Game Theory, Business Strategy, and Thinking Strategically

BUA 504 Data Warehousing and Visualization  
BUA 505 Predictive Analytics for Business Strategy  
BUA 506 Developing Value Through Business Analysis Applications  
BUA 507 Ethical Business Decision-Making  
BUA 508 Risk Analytics  
BUA 509 Web Analytics  
BUA 510 Data Science Applications with R or Python  
BUA 511 Data Visualization and interpretation using Tableau  
BUA 512 Business Cognitive Analytics and Applications  
BUA 513 Financial Engineering: Computational and Quantitative Methods  
BUS 516 Principles of quality management  
BUS 518 Applied Statistics  
BUS 520 Emerging technologies for product development  
BUS 521 Management of Technology and Innovation  
BUS 688 Special Topics (1-3 credit hours)  
BUS 689 Independent Study (1-3 credit hours)  
BUS 690 Strategic Management and Business Policy  
HCM 535 Data Analytics Applications in Healthcare  
HCM 538 Predictive Analytics and Decision Models in Healthcare  
HRM 532 Managing Human Capital using SAP HCM - [ITU/SAP University Alliances](#)  
HRM 535 Human Resources and Information Technology using SAP HCM\*-  
[ITU/SAP University Alliances](#)  
MGT 569 Strategic Operations Management  
MGT 572 High-Technology Entrepreneurship  
MIS 545 Data Mining and Business Intelligence using SAP-ITU/SAP University Alliance  
MKT 593 Marketing with Digital Perspectives using SAP CRM - [ITU/SAP University Alliances](#)

\* Students intending to do HRM 535 must complete HRM 532 as a pre-requisite course

### ELECTIVE COURSES

A sufficient number of Elective Courses from MBA must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

### ECONOMICS: BUSINESS AND DEVELOPMENT

This concentration will prepare students to work on real life cases in current economy. It will teach them how to review and analyze local and global economy, and provides knowledge necessary to address issues related to economics in global business environment. Also, this concentration will prepare students to take certifications in Business Economics and Economic Development.

Economics: Business and Development concentration develops five skills areas:

Mathematical / Quantitative: Students will study economic quantitative data to develop feasible solutions using mathematical modeling based on the historic data..  
Analytical: The mathematical models can be used for predictive analytics and trend forecasting.  
Innovative Thinking: As the economics and business and development can have local and global impact, a critical thinking and strategies will be studied.

**Technical / Computer Skills:** As the quantitative data requires in-depth and multi-facet analysis, students will be a chance to use their technical skills in developing and using economic models developed using specialized software and algorithm related to economics.

**Interpersonal Communication:** As the importance of economy can span across the globe, students will develop ways to communicate effectively.

## EMPHASIS LEARNING OUTCOMES

1. Analyze business economics to formulate a short term and long terms goals [Mapped to PLOs 1, 5].
2. Construct models in evaluating business problems considering on-going economic conditions [Mapped to PLOs 1, 4].
3. Solve business economics challenges by leveraging data analytics [Mapped to PLOs 1, 4, 5].
4. Appraise diverse and global environment with feasible economic solutions [Mapped to PLOs 2, 3, 5].
5. Formulate ethical decisions considering global economics in perspective [Mapped to PLOs 1, 4, 5].

## ECONOMICS: BUSINESS AND DEVELOPMENT ELOS MAPPING TO BUSINESS PROGRAM LEARNING COMPETENCIES

Learning Competencies (LCs)	MBA ELOs
LC 1: Communication (spoken, and written)	ELO 4: Appraise diverse and global environment with feasible economic solutions [Mapped to PLOs 2, 3, 5]
LC 2: Leadership (includes individual strengths, and collaboration)	ELO 1: Analyze business economics to formulate a short term and long terms goals [Mapped to PLOs 1, 5] ELO 4: Appraise diverse and global environment with feasible economic solutions [Mapped to PLOs 2, 3, 5] ELO 5: Formulate ethical decisions considering global economics in perspective [Mapped to PLOs 1, 4, 5]
LC 3: Critical Thinking	ELO 1: Analyze business economics to formulate a short term and long terms goals [Mapped to PLOs 1, 5] ELO 2: Construct models in evaluating business problems considering on-going economic conditions [Mapped to PLOs 1, 4] ELO 3: Solve business economics challenges by leveraging data analytics [Mapped to PLOs 1, 4, 5] ELO 5: Formulate ethical decisions considering global economics in perspective [Mapped to PLOs 1, 4, 5]
LC 4: Focused Knowledge	ELO 1: Analyze business economics to formulate a short term and long terms goals [Mapped to PLOs 1, 5] ELO 3: Solve business economics challenges by leveraging data analytics [Mapped to PLOs 1, 4, 5] ELO 5: Formulate ethical decisions considering global economics in perspective [Mapped to PLOs 1, 4, 5]

## ECONOMICS BUSINESS AND DEVELOPMENT CURRICULUM REQUIREMENTS

The students should successfully complete 39 credit hours.

### Students should complete the following core courses

#### REQUIRED CORE COURSES

MGT 503 Organizational Leadership theories  
FIN 534 Financial and Economic Analysis  
BUA 500 Principles of Business Analytics

#### RECOMMENDED COURSE:

MKT 551 Competitive Marketing Strategies

1 capstone course for a total of 3 credit hours

#### CAPSTONE COURSE

MBN 697 MBA Thesis

OR

BUA 690 Simulation & Optimization for Business Analytics

#### INTERNSHIP

INT 593 Internship (1 credit hour)

#### ITU PRESENTS

- » PRE-500 ITU Presents (1/3)  
(3 courses for a total of 1 credit hour)

#### ITU NUGGET COURSES (2 CREDIT HOURS)

- » IDS 550 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience “Unity of

- » **Knowledge” Content (½ - 2 credit hours)**
- » **IDS 553 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)**
- » **IDS 554 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)**
- » **IDS 555 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)**

To graduate with a concentration in Economics: Business and Development, students need to complete at least four (4) courses from the following concentration courses for a total of 12 credit hours

## **REQUIRED ECONOMICS: BUSINESS AND DEVELOPMENT COURSES:**

- BUA 501 Quantitative Analysis
- BUA 503 Game Theory, Business Strategy, and Thinking Strategically
- ECN 500 Principles of Economics
- ECN 502 Principles of Economic Uncertainty and Complexity
- ECN 503 Fundamentals of Economic Development
- ECN 504 Economics of Business
- ECN 505 Economics of Strategy and Managerial Decision Making
- ECN 510 Fundamentals of the real world Economy

## **ELECTIVE COURSES**

**A sufficient number of Elective Courses from MBA must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).**

- ACT 500 Financial Accounting
- ACT 502 International Accounting
- ACT 600 Managerial Accounting
- BUA 513 Financial Engineering: Computational and Quantitative Methods
- ECN 501 Principles of Microeconomics
- ECN 506 Financial Crisis - History
- ECN 507 Behavioral Economics
- ECN 508 Economic of Financial Markets
- ECN 509 Economic of Emerging Markets
- FIN 523 Macroeconomic Theory
- FIN 526 International Economics
- FIN 525 Econometrics
- FIN 517 Financial Institutions
- FIN 518 Financial and Socially Responsible Investing
- FIN 519 Corporate Valuation
- FIN 520 Investment Management
- FIN 521 International Financial Management
- FIN 522 Behavioral Finance
- INB 553 Fundamentals of International Business
- INB 554 International Financial Markets
- MKT 587 Comparative Studies of MNC, FDI, and International Trade

## **ENTERPRISE RESOURCE PLANNING (ERP)**

The Enterprise Resource Planning (ERP)/ Systems, Applications, and Products (SAP) concentration was created to provide

students a curriculum that is professionally applicable in a global context. The concentration in ERP/SAP prepares students to be competitive in the ever-expanding industry demand for consultants, business process analysts, project managers, systems specialists, SAP functional analysts, and managers across several business domains.

This concentration will prepare students for industry recognized certificates from the SAP University Alliance, and/or complete certifications of interest in a variety of areas such as SAP MM, SD, FI/CO, ABAP, HR, etc.

## **ERP/SAP DEVELOPS THE FOLLOWING SKILLS AREAS:**

**Analytical/ Critical Thinking:** Intending ERP/SAP professionals will build analytical skills needed to make decisions based on business operating requirements, technical/technological limitations, and a variety of other factors. Professionals in this field are required to balance competing requirements to develop solutions.

**Innovative Thinking:** A key skill required of ERP/SAP professionals is the ability to think innovatively, and come up with innovative, cost effective, and operationally viable configuration solutions. This requires students to think outside the box, and use creativity in developing these solutions.

**Technical / Computer Programming:** A career as an ERP/SAP professional requires involvement in developing and/or overseeing the implementation of functional ERP/SAP modules for complex business requirements. Through practical, hands on classroom assignments, students will learn the nuances of ERP/SAP implementation. This also requires students to be proficient in a certain functional (e.g. marketing, accounting, HR, etc.) or technical (e.g. ABAP) area.

### **Collaboration & Interpersonal Communication:**

Communication is important for ERP/SAP professionals. Their ability to deal with other people is also critical to the success of implementation projects. ERP/SAP implementation experts are often the liaison between business process experts and technical teams. The courses will consist of written and verbal practical communication, active listening and understanding, customer or client engagement, and teamwork.

## **EMPHASIS STUDENT LEARNING OUTCOMES**

The student learning outcomes are intended to improve student learning in the following areas: analytical skills, communication, critical thinking, ethical reasoning, global position, information technology, and the legal systems. Upon completion of the MBA in ERP/SAP concentration, graduates will:

1. Evaluate key organizational processes for points of integration from a systems (ERP/SAP) perspective. [Mapped to PLOs 1,3,4]
2. Design, test, and execute business processes using SAP/ERP configuration tools. [Mapped to PLOs 1,4,5]
3. Formulate strategy (operational and IT) that takes into account current and future technological advances. [Mapped to PLOs 2,4,5]
4. Summarize the impact of globalization on organizational decisions especially as they relate to ERP/SAP implementations. [Mapped to PLOs 1,2,4,5]
5. Appraise and formulate a plan for professional expertise in a particular functional area (e.g. supply chain management, HR, finance, marketing, etc.) [Mapped to PLOs 1, 2,3,4]

## **ENTERPRISE RESOURCE PLANNING (ERP)/ SYSTEMS, APPLICATIONS, AND PRODUCTS (SAP)**

### **ELOS MAPPING TO BUSINESS PROGRAM LEARNING COMPETENCIES (LCS)**

Learning Competencies (LCS)	Enterprise Resource Planning ELOs
LC 1: Communication (spoken, and written)	ELO 3: Formulate strategy (operational and IT) that takes into account current and future technological advances [Mapped to PLOs 2,4,5]
LC 2: Leadership (includes individual strengths, and collaboration)	ELO 1: Evaluate key organizational processes for points of integration from a systems (ERP/SAP) perspective. [Mapped to PLOs 1,3,4]  ELO 2: Design, test, and execute business processes using SAP/ERP configuration tools. [Mapped to PLOs 1,4,5]  ELO 5: Appraise and formulate a plan for professional expertise in a particular functional area (e.g. supply chain management, HR, finance, marketing, etc.) [Mapped to PLOs 1, 2,3,4]
LC 3: Critical Thinking	ELO 1: Evaluate key organizational processes for points of integration from a systems (ERP/SAP) perspective. [Mapped to PLOs 1,3,4]  ELO 4: Summarize the impact of globalization on organizational decisions especially as they relate to ERP/SAP implementations. [Mapped to PLOs 1,2,4,5]
LC 4: Focused Knowledge	ELO 3: Formulate strategy (operational and IT) that takes into account current and future technological advances [Mapped to PLOs 2,4,5]  ELO 5: Appraise and formulate a plan for professional expertise in a particular functional area (e.g. supply chain management, HR, finance, marketing, etc.) [Mapped to PLOs 1, 2,3,4]

### **ERP/SAP CURRICULUM REQUIREMENTS**

The students should successfully complete 39 credit hours.

Students should complete the following core courses.

#### **Students should complete the following core courses**

##### **REQUIRED CORE COURSES**

MGT 503 Organizational Leadership theories

FIN 534 Financial and Economic Analysis

MIS 527 Technology and Operations Management: Creating value

##### **RECOMMENDED COURSE:**

MKT 551 Competitive Marketing Strategies

1 capstone course for a total of 3 credit hours

##### **CAPSTONE COURSE**

MBN 697 MBA Thesis

OR

MGT 690 Pitching a Business Plan to Venture Capitalists

##### **INTERNSHIP**

INT 593 Internship (1 credit hour)

#### **ITU PRESENTS**

- » PRE-500 ITU Presents (1/3)  
(3 courses for a total of 1 credit hour)

#### **ITU NUGGET COURSES (2 CREDIT HOURS)**

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

To graduate with a concentration in ERP/SAP, students need to complete at least four (4) courses from the following ERP/SAP courses for a total of 12 credit hours

## **REQUIRED ERP/SAP COURSES:**

ACT 603 Accounting Information Systems/ERP - **ITU/SAP**

### **University Alliances**

BUS 688 Special Topics (1-3)

BUS 689 Independent Study (1-3)

BUS 690 Strategic Management and Business Policy

ERP 509 Introduction to ERP Systems using SAP - **ITU/SAP**

### **University Alliances**

ERP 510 ABAP - Advanced Business Application

Programming - **ITU/SAP**

ERP 511 Enterprise Portal technology using NetWeaver - **ITU/SAP**

### **University**

ERP 512 Enterprise procurement processes (MM) - **ITU/SAP**

### **University Alliances**

ERP 513 Sales order management with ERP - **ITU/SAP University**

### **Alliances**

HRM 532 Managing Human Capital using SAP HCM – **ITU/SAP**

### **University Alliances**

HRM 535 Human Resources and Information Technology using SAP HCM\*- **ITU/SAP University Alliances**

MIS 545 Data Mining & Business Intelligence using

ERP/SAP - **ITU/SAP Alliances**

MKT 593 Marketing with Digital Perspectives using SAP CRM -

**ITU/SAP University Alliances**

\* Students intending to do HRM 535 must complete HRM 532 as a pre-requisite course

## **JOINT RECOGNITION AWARD**

Upon completing 3 of the above ERP/SAP courses with a grade of "B" or above, the student is rewarded a joint recognition award from ITU and SAP University Alliances.

## **ELECTIVE COURSES**

A sufficient number of Elective Courses from MBA must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

## **FINANCIAL ANALYSIS AND RISK MANAGEMENT**

The Financial Analysis and Risk Management concentration helps graduate to work as financial analysts. They will use data and information of financial statements for assessment, credit risk valuation, investment, and economic decisions. There is an increasing emphasis on credit, market and financial risk management.

This concentration will prepare you for the Chartered Financial Analyst (CFA), and for the Professional Risk Management (PRM) exams.

It will equip the students with the knowledge to develop both comprehensive financial knowledge and specialized risk management practice. Pursuing this concentration, you will both earn a degree in Finance and be prepared

for CFA and FRM exams.

The topics that will be covered in this concentration are the following:

Quantitative Methods for Finance

Applied Economics for Managers

Financial Management

Macroeconomics and Financial Markets

Investment Management Analysis

Financial Derivatives

Financial Analysis and Risk Management develops five skills areas:

**Mathematical / Quantitative:** Students will have the chance to develop sound skills in mathematical and quantitative methods. This will involve application in reviewing financial forecasts, trends, and other reports.

**Analytical:** Intending professionals will build analytical skills needed to make predictive decisions based on models of risk, and other factors.

**Innovative Thinking:** A key skill required is the ability to think innovatively, and come up with new financial products or service offerings. This requires students to think outside the box, and use creativity in developing financial strategies after a careful consideration of risk.

**Technical / Computer Skills:** A career in financial analysis and risk management requires professionals to be involved in overseeing the development of complex computer code and algorithms to automate financial decisions. Through the courses in this concentration, students will have the opportunity to develop their technical skills.

**Interpersonal Communication:** Communication is important for professionals. Their ability to deal with other people is also critical to their success. The courses will consist of written and verbal practical communication, active listening and understanding, customer or client engagement, and teamwork.

## **EMPHASIS STUDENT LEARNING OUTCOMES:**

*The MBA in Financial Analysis and Risk Management aims to help students to graduate with the ability to:*

1. Illustrate the knowledge of quantitative methods such as mathematics, statistics, and economics. [Mapped to PLOs 4]
2. Design strategies that minimize financial risk using financial instruments. [Mapped to PLOs 1,4,5]
3. Identify, formulate, and solve financial problems from an integrated systems perspective. [Mapped to PLOs 1,2,4,5]
4. Create data modeling tools for predictive financial decision making and risk management. [Mapped to PLOs 1,3,4,5]
5. Summarize the effect of financial analysis and risk management solutions in an economic, environmental, and societal framework. [Mapped to PLOs 1,2,4,5]

## **FINANCIAL ANALYSIS AND RISK MANAGEMENT ELOS MAPPING TO BUSINESS PROGRAM LEARNING COMPETENCIES (LCS)**

Learning Competencies (LCs)	Financial Analysis and Risk Management ELOs
LC 1: Communication (spoken, and written)	ELO 5: Summarize the effect of financial analysis and risk management solutions in an economic, environmental, and societal framework [Mapped to PLOs 1,2,4,5]
LC 2: Leadership (includes individual strengths, and collaboration)	ELO 2: Design strategies that minimize financial risk using financial instruments. [Mapped to PLOs 1,4,5]  ELO 3: Identify, formulate, and solve financial problems from an integrated systems perspective. [Mapped to PLOs 1,2,4,5]  ELO 4: Create data modeling tools for predictive financial decision-making and risk management. [Mapped to PLOs 1,3,4,5]
LC 3: Critical Thinking	ELO 2: Design strategies that minimize financial risk using financial instruments. [Mapped to PLOs 1,4,5]  ELO 3: Identify, formulate, and solve financial problems from an integrated systems perspective. [Mapped to PLOs 1,2,4,5]
LC 4: Focused Knowledge	ELO 1: Illustrate the knowledge of quantitative methods such as mathematics, statistics, and economics. [Mapped to PLOs 4]  ELO 5: Summarize the effect of financial analysis and risk management solutions in an economic, environmental, and societal framework. [Mapped to PLOs 1,2,4,5]

### **FINANCIAL ANALYSIS AND RISK MANAGEMENT CURRICULUM REQUIREMENTS**

The students should successfully complete 39 credit hours. Students should complete the following core courses.

#### **REQUIRED CORE COURSES**

MGT 503 Organizational Leadership theories  
FIN 534 Financial and Economic Analysis  
BUA 500 Principles of Business Analytics

#### **RECOMMENDED COURSE:**

MKT 551 Competitive Marketing Strategies

#### **CAPSTONE COURSE**

1 course for a total of 3 credit hours

BUA 690 Simulation & Optimization for Business Analytics

#### **INTERNSHIP**

INT 593 Internship (1 credit hour)

#### **ITU PRESENTS**

- » PRE-500 ITU Presents (1/3)  
(3 courses for a total of 1 credit hour)

#### **ITU NUGGET COURSES (2 CREDIT HOURS)**

- » IDS 550 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)

To graduate with a concentration in Financial Analysis and Risk Management, students need to complete at least four (4) courses from the following courses for a total of 12 credit hours

## **REQUIRED COURSES**

Students are required to possess mathematical, quantitative, and financial knowledge as they navigate complex careers in their fields. The courses are presented as inter-related or interdisciplinary courses that meet all areas of proficiency.

BUA 501 Quantitative Analysis

BUA 508 Risk Analytics

BUA 510 Data Science Applications with R or Python

BUA 513 Financial Engineering: Computational and Quantitative Methods

BUS 504 Contract Management & Financial Planning

BUS 518 Applied Statistics

BUS 688 Special Topics (1-3)

BUS 689 Independent Study (1-3)

BUS 690 Strategic Management and Business Policy

FIN 515 Managerial Finance

FIN 516 Entrepreneurial Finance

FIN 517 Financial Institutions

FIN 518 Financial and Socially Responsible Investing

FIN 519 Corporate Valuation

FIN 520 Investment Management

FIN 521 International Financial Management

FIN 522 Behavioral Finance

FIN 523 Macroeconomic Theory

FIN 525 Econometrics

FIN 526 International Economics

FIN 604 Securities Analysis

FIN 605 Financial Derivatives and Risk Management

FIN 606 Corporate Finance

FIN 607 Mergers and Acquisitions

HCM 534 Financial Management for Healthcare Organization

**Management / Leadership:** Understanding, proficiencies, and capabilities necessary to manage work and to encourage and support individuals and teams to complete project tasks and objectives.

**Communication:** Communication is important for the Global Entertainment Professionals. The courses will consist of written and verbal practical communication,

## **GEM EMPHASIS LEARNING OUTCOMES (ELOS)**

The ELOs are intended to improve student learning in the following areas: Management, Marketing, communication, critical thinking, global position, entertainment and leadership. Upon completion of the

MBA, graduates will:

## **MBA GLOBAL ENTERTAINMENT MANAGEMENT ELOS**

1. Formulate strategic business plan with a mission and vision for a global entertainment industry [Mapped to PLO 2,3,4]
2. Experiment with creative and innovative thoughts utilizing hypothetical situations to enable critical thinking [Mapped to PLOs 1,4]
3. Illustrate real-time experiences and lessons learned through global entertainment platform for knowledge sharing [Mapped to PLOs 2,3,5]
4. Summarize different means of communication and leadership in unifying diverse cultures leveraging most widely used entertainment industry [Mapped to PLOs 3,5]
5. Construct conducive leadership and organizational management for global entertainment industry [Mapped to PLOs 1,2,5]

## **ELECTIVE COURSES**

A sufficient number of Elective Courses from MBA must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

## **GLOBAL ENTERTAINMENT MANAGEMENT**

With the advent of rapid growth in Global Entertainment Industry, the need for people with both Management and Entertainment experience is also growing.

Due to the growing of Entertainment Industry, the need for people with both Management and Entertainment experience grows as well. International Technological University (ITU) is one of the few leading universities specializing in providing education and experience in this area.

## **GEM OFFERS FIVE AREAS OF SKILL:**

**Cultural differences:** Highly sensitive to and respectful of cultural differences

**Critical thinking:** Proficiencies in the fields of organizational change management, business process analysis, business process improvement, and enterprise strategy and planning.

**Practical Reasoning:** Capability to efficiently conceptualize, apply, study, create, and assess the collected information.

Learning Competencies (LCs)	Global Entertainment Management ELOs
LC 1: Communication (spoken, and written)	ELO 4: Summarize different means of communication and leadership in unifying diverse cultures leveraging most widely used entertainment industry [Mapped to PLOs 3,5]
LC 2: Leadership (includes individual strengths, and collaboration)	ELO 2: Experiment with creative and innovative thoughts utilizing hypothetical situations to enable critical thinking [Mapped to PLOs 1,4]  ELO 5: Construct conducive leadership and organizational management for global entertainment industry [Mapped to PLOs 1,2,5]
LC 3: Critical Thinking	ELO 2: Experiment with creative and innovative thoughts utilizing hypothetical situations to enable critical thinking [Mapped to PLOs 1,4]
LC 4: Focused Knowledge	ELO 1: Formulate strategic business plan with a mission and vision for a global entertainment industry [Mapped to PLO 2,3,4]  ELO 3. Illustrate real-time experiences and lessons learned through global entertainment platform for knowledge sharing [Mapped to PLOs 2,3,5]

**Note 1:**

The Department Chair will add, remove and update required Concentration and Elective courses based on industry relevance. Department Chair approval is required for any additions, changes or exceptions to the Global Entertainment Management concentration.

**Note 2:**

The nuggets courses are open to all students from all the programs including DA program.

**Note 3:**

Refer to the Digital Arts program of the catalog for the description of the following Digital Arts courses: DGA 500, 503, 504, 507, 508, 511, 512, 523, 526, 533, 534, 535, 536, and 621.

**REQUIRED 3 CORE COURSE FOR A TOTAL OF 9 CREDIT HOURS:**

MGT 503 Organizational Leadership Theories  
FIN 534 Financial and Economic Analysis  
MIS 527 Technology and Operations Management: Creating Value

**CONCENTRATION COURSES**

**Choose four (4) from the following courses for a total of 12 credit hours.**

**Two (2) courses are required from Business topics for a total of 6 credit hours:**

INB 556 Global Strategic Management  
INB 558 Global Marketing and Strategy  
MGT 583 Global Entrepreneurship and Innovation  
MKT 551 Competitive Marketing Strategies  
MKT 591 Advertising Strategy

**Two (2) courses are required from the DA topics for a total of 6 credit hours:**

DGA 501 New Media Production  
DGA 523 Social Network Marketing and Publishing  
DGA 533 Artist Representation  
DGA 621 Producing Digital Media  
DGA 534 Production Management  
DGA 535 Business of Entertainment  
DGA 536 Originating and Developing Ideas

**Capstone Project or Thesis course for 3 credit hours**

MGT 690 Pitching a Business Plan to Venture Capitalists,  
OR  
MBN 697 Thesis

**INTERNSHIP**

INT 593 Internship (1 credit hour)

**ITU PRESENTS**

» PRE-500 ITU Presents (1/3)  
(3 courses for a total of 1 credit hour)

### **ITU Nugget Courses (2 Credit Hours)**

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

### **ELECTIVE COURSES**

A sufficient number of Elective Courses from MBA must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

- BUS 502 Project Management and Leadership
- BUS 509 Leading and Managing Change
- BUS 517 Organization Culture and Diversity
- MGT 568 Impact of Intellectual Property in a Global Economy
- MGT 571 Critical Thinking Strategies in Decision Making
- MKT 590 Marketing with Social Media
- MKT 593 Marketing with Digital Perspectives using SAP
- CRM - ITU/SAP University Alliances
- DGA 503 Storyboard Design
- DGA 504 Global Storytelling
- DGA 507 Design Fundamentals
- DGA 508 CG Software Fundamentals
- DGA 511 General Production Pipelines
- DGA 512 Web Graphic Design
- DGA 526 Screenwriting

### **HEALTHCARE MANAGEMENT**

The Healthcare Management helps students learn the competencies to meet the challenges of today's healthcare's system, while looking for innovative answers for tomorrow.

Healthcare management is one of the fastest growing careers. ITU's MBA in Healthcare Management prepares students to play a serious role in the industry, by practicing effective leadership skills that support the business insights.

The Healthcare Management curriculum builds on the established strength of management practices, as the manager's role in diverse healthcare settings continues to grow. The Healthcare major draw on a rich variety of elective courses, including courses in behavioral theories, clinical research, biomedical sciences, and information technology.

The Healthcare Management will give students great opportunities for development. Earning that Master's degree with ITU will equip graduates with the necessary skills and knowledge to work in a variety of health-care-related environments.

Healthcare Management develop five skills areas:

- 1. Decision Making:** Managers of healthcare facilities are in charge of collecting important information and listening to the arguments to make a decision.
- 2. Teamwork:** Healthcare managers need to work with their staff to make sure the facility is running effectively and successfully. In business, teamwork is essential in many areas to encourage and support colleagues.
- 3. Financial Management:** Healthcare managers need to be familiar with financial management. The managers of all healthcare facilities have budgets they must follow, and they work with accountants and advisers to make sure their facilities stay financially safe.
- 4. Communication and Interpersonal Skills:** It is important to communicate well with patients and colleagues. Healthcare managers work with their own staff, and they interact with clients and professionals. Interpersonal skills are necessary for healthcare managers because they are working with sad, sick, or stressed patients. This creates a challenge, and needs understanding and sympathy.
- 5. Industry-Healthcare Knowledge:** People pursuing a career in the healthcare management need to have scientific and medical knowledge. This will help them communicate effectively with doctors, nurses and medical staff.

### **EMPHASIS LEARNING OUTCOMES (ELOS):**

The Healthcare Management aims to help students to graduate with the ability to:

- ELO 1: Identify and build skills to work and communicate successfully with varied groups that motivate joint ownership of results. [Mapped to PLOs 2, 3, 4]
- ELO 2: Select relevant business skills to innovate and improve productivity in the healthcare environment. [Mapped to PLOs 1, 2, 4, 5]
- ELO 3: Interpret and predict global business trends in response to changing healthcare environments and enhance organizational performance. [Mapped to PLOs 1, 2, 4, 5]
- ELO 4: Determine appropriate data analytics methodologies to support critical thinking for decision making. [Mapped to PLOs 1, 4, 5]
- ELO 5: Illustrate skills from numerous disciplines to transform healthcare practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]

## **HEALTHCARE MANAGEMENT ELOS MAPPING TO BUSINESS PROGRAM LEARNING COMPETENCIES**

Learning Competencies (LCs)	Healthcare Management ELOs
LC 1: Communication (spoken, and written)	ELO 1: Identify and build skills to work and communicate successfully with varied groups that motivate joint ownership of results. [Mapped to PLOs 2, 3, 4]
LC 2: Leadership (includes individual strengths, and collaboration)	<p>ELO 2: Select relevant business skills to innovate and improve productivity in the healthcare environment. [Mapped to PLOs 1, 2, 4, 5]</p> <p>ELO 3: Interpret and predict global business trends in response to changing healthcare environments and enhance organizational performance. [Mapped to PLOs 1, 2, 4, 5]</p> <p>ELO 4: Determine appropriate data analytics methodologies to support critical thinking for decision making. [Mapped to PLOs 1, 4, 5]</p> <p>ELO 5: Illustrate skills from numerous disciplines to transform healthcare practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]</p>
LC 3: Critical Thinking	<p>ELO 3: Interpret and predict global business trends in response to changing healthcare environments and enhance organizational performance. [Mapped to PLOs 1, 2, 4, 5]</p> <p>ELO 4: Determine appropriate data analytics methodologies to support critical thinking for decision making. [Mapped to PLOs 1, 4, 5]</p>
LC 4: Focused Knowledge	<p>ELO 2: Select relevant business skills to innovate and improve productivity in the healthcare environment. [Mapped to PLOs 1, 2, 4, 5]</p> <p>ELO 3: Interpret and predict global business trends in response to changing healthcare environments and enhance organizational performance. [Mapped to PLOs 1, 2, 4, 5]</p> <p>ELO 5: Illustrate skills from numerous disciplines to transform healthcare practice using entrepreneurial and innovative perspectives. [Mapped to PLOs 1, 2, 3, 4, 5]</p>

## **HEALTHCARE MANAGEMENT REQUIREMENTS**

### **REQUIRED CORE COURSES**

MGT 503 Organizational Leadership theories  
 FIN 534 Financial and Economic Analysis  
 MIS 527 Technology and Operations Management:  
 Creating value

### **RECOMMENDED COURSE:**

MKT 551 Competitive Marketing Strategies

### **CAPSTONE COURSE**

1 course for a total of 3 credit hours

HCM 690 Healthcare Innovation Management Project

### **INTERNSHIP**

INT 593 Internship (1 credit hour)

### **ITU PRESENTS**

» PRE-500 ITU Presents (1/3)  
 (3 courses for a total of 1 credit hour)

### **ITU NUGGET COURSES (2 CREDIT HOURS)**

» IDS 550 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)  
 » IDS 551 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)

- » **IDS 552 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)**
- » **IDS 553 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)**
- » **IDS 554 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)**
- » **IDS 555 ITU Nuggets - Consilience “Unity of Knowledge” Content (½ - 2 credit hours)**

Students are required to take at least four (4) Healthcare Management (HCM) elective courses in order to graduate with a Healthcare Management concentration.

## **HEALTHCARE ELECTIVE COURSES**

### **RECOMMENDED COURSES FOR HEALTHCARE**

BIO 510 Ethics in Medical Research  
 BUA 500 Principles of Business Analytics  
 HCM 509 Scientific Writing and Research for Healthcare  
 HCM 510 A Regulatory Overview & Compliance  
 HCM 511 Concepts of Healthcare Management  
 HCM 513 Innovating Biomedical Technology  
 HCM 515 Health Information Technology  
 HCM 525 Principles of Managed Care

HCM 539 Healthcare Marketing

### **HEALTHCARE DEPTH**

BIO 500 Clinical Research Management  
 BIO 501 Modern Medicine and Biology  
 BIO 506 Biotech industry fundamentals  
 HCM 519 Healthcare Ethics  
 HCM 529 Mental Health and Wellbeing  
 HCM 531 Complementary and Alternative Medicine  
 HCM 534 Financial Management for Healthcare Organizations  
 HCM 536 High Reliability Healthcare Organizations  
 HCM 537 Commercializing Medical Devices, Diagnostics and Biomedical Innovations

### **HEALTHCARE ANALYTICS**

HCM 520 Healthcare Leadership, Patient Safety and Quality Improvement  
 HCM 535 Data Analytics Applications in Healthcare  
 HCM 538 Predictive Analytics and Decision Models in Healthcare  
 BUS 688 Special Topics (1-3 credit hours)  
 BUS 689 Independent Study (1-3 credit hours)  
 BUS 690 Strategic Management and Business Policy

### **ELECTIVE COURSES**

A sufficient number of Elective Courses from MBA must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

## **MANAGEMENT INFORMATION SYSTEMS (MIS)**

The Management Information Systems (MIS) concentration aims to provide students with technological and business tools to solve a variety of business problems. Within the MIS concentration, students will learn to analyze, formulate, and implement Operations and Information technology (IT) strategy. They will also learn to manage and improve a variety of business operations.

### **MIS DEVELOPS THE FOLLOWING SKILLS AREAS:**

**Analytical/ Critical Thinking:** Intending MIS professionals are required to be “expert generalists” and be proficient in analyzing business and IT requirements.

**Strategic Thinking:** MIS professionals will be involved in implementing Operational and/or IT strategy for organizations. Coursework will prepare students to think in terms of strategy driven vision, mission, and project plans required for success in organizations.

**Technical Proficiency:** A career as an MIS professional requires some knowledge of IT technologies and associated architectures. MIS coursework will provide students groundwork in practicing their skills in such technical domains.

**Project & Program Management:** MIS professionals at various stages in their career will be involved in managing IT and/or Operations projects as analysts or specialists. A foundation in project/program management principles will be critical to their success.

**Collaboration & Interpersonal Communication:** Communication is important for MIS professionals. Their ability to deal with other people is also critical to the success of IT and/or Operations strategy. The courses will consist of written and verbal practical communication, active listening and understanding, customer or client engagement, and teamwork.

### **EMPHASIS STUDENT LEARNING OUTCOMES**

These learning outcomes are intended to improve student skills and knowledge in the following areas: analytical skills, communication, critical thinking, ethical reasoning, global position, information technology, and the legal systems. Upon completion of the MBA in MIS concentration, graduates will:

1. Identify the role of Management Information Systems in leadership decision making to attain competitive advantage. [Mapped to PLOs 1,4,5]
2. Design and develop information systems to present solutions to business needs. [Mapped to PLOs 1,2,3,4]
3. Generate the strategic plans in terms of direction, mission, and vision for information systems

- projects. [Mapped to PLOs 1,2,4,5]
4. Construct a coherent plan that addresses laws and regulations, compliance, and security concerns within a business entity. [Mapped to PLOs 2,3,4,5]
5. Explain and develop an efficient MIS project that meets relevant professional criteria and principles. [Mapped to PLOs 2,3,4,5]

## **MANAGEMENT INFORMATION SYSTEMS ELOS MAPPING TO BUSINESS PROGRAM LEARNING COMPETENCIES (LCS)**

Learning Competencies (LCs)	Management Information Systems ELOs
LC 1: Communication (spoken, and written)	ELO 2: Design and develop information systems to present solutions to business needs [Mapped to PLOs 1,2,3,4]  ELO 5: Explain and develop an efficient MIS project that meets relevant professional criteria and principles [Mapped to PLOs 2,3,4,5]
LC 2: Leadership (includes individual strengths, and collaboration)	ELO 1: Identify the role of Management Information Systems in leadership decision making to attain competitive advantage [Mapped to PLOs 1,4,5]  ELO 2: Design and develop information systems to present solutions to business needs [Mapped to PLOs 1,2,3,4]  ELO 3: Generate the strategic plans in terms of direction, mission, and vision for information systems projects [Mapped to PLOs 1,2,4,5]  ELO 5: Explain and develop an efficient MIS project that meets relevant professional criteria and principles [Mapped to PLOs 2,3,4,5]
LC 3: Critical Thinking	ELO 1: Identify the role of Management Information Systems in leadership decision making to attain competitive advantage [Mapped to PLOs 1,4,5]  ELO 4: Construct a coherent plan that addresses laws and regulations, compliance, and security concerns within a business entity [Mapped to PLOs 2,3,4,5]
LC 4: Focused Knowledge	ELO 1: Identify the role of Management Information Systems in leadership decision making to attain competitive advantage [Mapped to PLOs 1,4,5]  ELO 4: Construct a coherent plan that addresses laws and regulations, compliance, and security concerns within a business entity [Mapped to PLOs 2,3,4,5]

### **MANAGEMENT INFORMATION SYSTEMS CURRICULUM REQUIREMENTS**

The students should successfully complete 39 credit hours. Students should complete the following core courses.

**Students should complete the following core courses**

### **REQUIRED CORE COURSES**

MGT 503 Organizational Leadership theories

FIN 534 Financial and Economic Analysis

MIS 527 Technology and Operations Management:  
Creating value

### **RECOMMENDED COURSE:**

MKT 551 Competitive Marketing Strategies

1 capstone course for a total of 3 credit hours

### **CAPSTONE COURSE**

MBN 697 MBA Thesis

OR

MGT 690 Pitching a Business Plan to Venture Capitalists

### **INTERNSHIP**

INT 593 Internship (1 credit hour)

## ITU PRESENTS

- » PRE-500 ITU Presents (1/3)
- » (3 courses for a total of 1 credit hour)

## ITU NUGGET COURSES (2 CREDIT HOURS)

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

To graduate with a concentration in MIS, students need to complete at least four (4) courses from the following MIS courses for a total of 12 credit hours

## REQUIRED MIS COURSES:

- ACT 603 Accounting Information Systems/ERP
- BUS 520 Emerging Technologies for Product Development
- BUS 521 Management of Technology and Innovation
- BUS 690 Strategic Management and Business Policy
- MGT 572 High-Technology Entrepreneurship
- MIS 537 Management Information Systems
- MIS 538 Business Database Applications
- MIS 539 Business Telecommunications
- MIS 540 Information Resource Management
- MIS 541 Managing Global Information Systems Projects
- MIS 542 Information Systems Innovation
- MIS 543 Human-Computer Interaction
- MIS 544 Business Decision Support Systems
- MIS 545 Data Mining & Business Intelligence using ERP/SAP - ITU/SAP University Alliances
- MIS 546 Data Science for Business
- MIS 547 Software Development Process Management
- MIS 548 Knowledge Management

## ELECTIVE COURSES

A sufficient number of Elective Courses from MBA must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

## PROJECT MANAGEMENT

The Project Management concentration was created to provide students with the skill set to "hit the ground running" as project/program/portfolio managers in a variety of contexts (e.g. software, construction, etc). The modern project manager bears responsibility to supervise myriad aspects of projects such as time, costs, risks, and others.

This concentration will help prepare students for industry recognized certifications such as PMP, CAPM, PMI-ACP, etc.

## PROJECT MANAGEMENT DEVELOPS THE FOLLOWING SKILLS AREAS:

**Leadership & Management:** This is one of the most critical skills required of intending Project Managers. Coursework in leadership, and project management seeks to hone this skillset in students. In addition, campus clubs and extra curricular activities will provide students to practice these skills in a non-threatening, non-judgmental environment.

**Strategic Thinking:** Project Managers will be involved in implementing managing several projects at a time. It is critical for students to understand organizational constraints, client vision, as well as other strategic areas in order to be successful in their roles. Through their coursework, students will understand each of these components and their interactions to maximize their success on the job.

**Problem Solving:** In their roles as project managers, students will be required to employ specific frameworks to identify and solve the problems they are faced with on projects. Coursework will equip students with the academic and practical knowledge of problem solving techniques. Case studies, and other in-class problems, will challenge students to identify innovative solutions to problems identified.

**Organizational Awareness:** As a project manager involved with several stakeholders and clients, students will be required to understand the hierarchy of, and the structure of the organization(s) they are working with. This awareness makes a great contribution to the project manager's abilities to identify problems, and provide innovative solutions to problems identified.

**Collaboration & Interpersonal Communication:** Communication is critical for Project Managers. Through the course of their work, they liaise with a variety of people internal and external to the organization such as senior executive, IT teams, and business operations teams. The courses will consist of written and verbal practical communication, active listening and understanding, customer or client engagement, and teamwork. In addition, campus clubs and extra curricular activities will provide students to practice their communication skills in a non-threatening, non-judgmental environment.

## EMPHASIS STUDENT LEARNING OUTCOMES

The student learning outcomes are intended to improve student learning in the following areas: analytical skills, communication, critical thinking, ethical reasoning, global position, information technology, and the legal systems. Upon completion of the MBA in Project Management concentration, graduates will:

1. Examine individual enterprise projects for effective selection and initiation [PLOs 1,3,4]
2. Design project plans that accurately forecast project parameters such as costs, budgets, timelines, and quality. [PLOs 1,2,4,5]
3. Devise processes for successful project monitoring, such as resource procurement, team scheduling and communication, quality control, and risk and change

- management. [PLOs 1,2,3,4]
4. Formulate strategies to report effectively on project performance, and deliverables in line with stakeholder expectations. [PLOs 1,2]
5. Appraise and apply traditional and agile project methodologies to ensure appropriate outcomes in line with organization or client requirements. [PLOs 1,3,4,5]

## **PROJECT MANAGEMENT ELOS MAPPING TO BUSINESS PROGRAM LEARNING COMPETENCIES (LCS)**

Learning Competencies (LCs)	Project Management ELOs
LC 1: Communication (spoken, and written)	<p><b>ELO 3:</b> Devise processes for successful project monitoring, such as resource procurement, team scheduling and communication, quality control, and risk and change management. <b>[Mapped to PLOs 1,2,3,4]</b></p> <p><b>ELO 4:</b> Formulate strategies to report effectively on project performance, and deliverables in line with stakeholder expectations. <b>[Mapped to PLOs 1,2]</b></p>
LC 2: Leadership (includes individual strengths, and collaboration)	<p><b>ELO 2:</b> Design project plans that accurately forecast project parameters such as costs, budgets, timelines, and quality. <b>[Mapped to PLOs 1,2,4,5]</b></p> <p><b>ELO 3:</b> Devise processes for successful project monitoring, such as resource procurement, team scheduling and communication, quality control, and risk and change management. <b>[Mapped to PLOs 1,2,3,4]</b></p> <p><b>ELO 5:</b> Appraise and apply traditional and agile project methodologies to ensure appropriate outcomes in line with stakeholder expectations. <b>[Mapped to PLOs 1,3,4,5]</b></p>
LC 3: Critical Thinking	<p><b>ELO 1:</b> Examine individual enterprise projects for effective selection and initiation. <b>[Mapped to PLOs 1,3,4]</b></p> <p><b>ELO 3:</b> Devise processes for successful project monitoring, such as resource procurement, team scheduling and communication, quality control, and risk and change management. <b>[Mapped to PLOs 1,2,3,4]</b></p> <p><b>ELO 4:</b> Formulate strategies to report effectively on project performance, and deliverables in line with stakeholder expectations. <b>[Mapped to PLOs 1,2]</b></p>
LC 4: Focused Knowledge	<p><b>ELO 1:</b> Examine individual enterprise projects for effective selection and initiation. <b>[Mapped to PLOs 1,3,4]</b></p> <p><b>ELO 2:</b> Design project plans that accurately forecast project parameters such as costs, budgets, timelines, and quality. <b>[Mapped to PLOs 1,2,4,5]</b></p> <p><b>ELO 3:</b> Devise processes for successful project monitoring, such as resource procurement, team scheduling and communication, quality control, and risk and change management. <b>[Mapped to PLOs 1,2,3,4]</b></p>

## **PROJECT MANAGEMENT CURRICULUM REQUIREMENTS**

The students should successfully complete 39 credit hours. Students should complete the following core courses.

## **STUDENTS SHOULD COMPLETE THE FOLLOWING CORE COURSES**

### **REQUIRED CORE COURSES**

MGT 503 Organizational Leadership theories  
FIN 534 Financial and Economic Analysis  
MIS 527 Technology and Operations Management: Creating value

### **RECOMMENDED COURSE:**

MKT 551 Competitive Marketing Strategies

1 capstone course for a total of 3 credit hours

### **CAPSTONE COURSE**

MBN 697 MBA Thesis

OR

MGT 690 Pitching a Business Plan to Venture Capitalists

### **INTERNSHIP**

INT 593 Internship (1 credit hour)

### **ITU PRESENTS**

- » PRE-500 ITU Presents (1/3)
- » (3 courses for a total of 1 credit hour)

### **ITU NUGGET COURSES (2 CREDIT HOURS)**

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

To graduate with a concentration in Project Management, students need to complete at least four (4) courses from the following Project Management courses for a total of 12 credit hours

### **REQUIRED PROJECT MANAGEMENT COURSES**

BUS 500 Project Management Frameworks  
BUS 501 Strategic Planning & Portfolio Management  
BUS 502 Project Management & Leadership  
BUS 503 Project Management - Agile Approach  
BUS 504 Contract Management & Financial Planning

BUS 506 Process Mapping & Control  
BUS 507 Project Procurement Management  
BUS 509 Leading and Managing Change  
BUS 517 Organization Culture and Diversity  
BUS 518 Applied Statistics  
BUS 521 Management of Technology and Innovation  
BUS 688 Special topics  
BUS 689 Independent Study  
BUS 690 Strategic Management and Business Policy  
MGT 567 Quality Control Management  
MGT 575 Project Management  
MGT 577 Project risk management  
MGT 611 Lean Six Sigma  
MGT 612 Advanced Project Management

### **ELECTIVE COURSES**

A sufficient number of Elective Courses from MBA must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

### **BUSINESS ADMINISTRATION - MINOR PROGRAMS**

To obtain a Minor in Business Administration Department, student is required to complete 4 courses for a total of 12 credit hours.

#### **Note 1:**

To pursue a Minor in any of the below Business Administration concentration, students should build the list of the courses, which includes one required core course and 3 elective courses from the chosen concentration. Students must obtain approval from the Chair of the Business Administration Program prior to initiating their Minor program.

#### **Note 2:**

Minor program from other departments:  
To obtain a Minor from the other Departments, students are required to complete 4 courses for a total of 12 credit hours from the other programs, such as EM, CS, SE, EE, and DA. Students need to consult the appropriate Department Chair for the required minor program courses

### **MBA - GENERAL (MINOR)**

#### **REQUIRED CORE COURSE**

MIS 527 Technology and Operations Management: Creating value  
Choose 3 courses from the following courses, or from the concentrations below (9 credit hours)

#### **MBA ELECTIVE COURSES**

ACT 500 Financial Accounting

ACT 501 Forensic Accounting  
ACT 502 International Accounting  
ACT 504 Tax Accounting Principles  
ACT 600 Managerial Accounting  
ACT 601 Cost Accounting  
ACT 602 Intermediate Accounting  
ACT 604 Auditing  
BUS 510 Regulation, Governance Ethical and Social Responsibility  
BUS 600 Research Methods  
BUS 688 Special Topics (1-3 credit hours)  
BUS 689 Independent Study (1-3 credit hours)  
BUS 690 Strategic Management and Business Policy  
HRM 528 Human Resource Management  
HRM 529 Employee Training and Development  
HRM 530 Employment law for business  
HRM 533 Strategic compensation: issues and opportunities  
INB 553 Fundamentals of International Business  
INB 554 International Financial Markets  
INB 556 Global Strategic Management  
INB 558 Global Marketing and Strategy  
MGT 560 Principles of Management  
MGT 561 Coaching - Changing Lives, Changing Organizations  
MGT 564 Principles of Public Relations  
MGT 566 Production and Operations Management  
MGT 571 Critical Thinking Strategies in Decision Making  
MGT 573 International Management  
MGT 576 Organizational Theory  
MGT 578 Business Communications  
MGT 579 Business Ethics  
MGT 580 Business Law  
MGT 581 Managing Emotions, Managing Self and Others  
MGT 582 Team and Group Dynamics  
MGT 583 Global Entrepreneurship and Innovation  
MGT 584 Supply Chain Management (Previously MKT 584)  
MGT 593 Intrapreneurship – Innovation from Within  
MGT 608 Business Statistics  
MKT 551 Competitive Marketing Strategies  
MKT 582 Marketing Management  
MKT 583 Entrepreneurial Marketing  
MKT 585 International Marketing  
MKT 586 Marketing Research  
MKT 587 Comparative Studies of MNC, FDI, and International Trade  
MKT 588 Consumer Behavior  
MKT 589 E-commerce  
MKT 590 Marketing with Social Media  
MKT 591 Advertising Strategy  
MKT 592 Supplier/Seller Management  
MKT 613 Advanced Marketing

## BUSINESS ANALYTICS (MINOR)

### REQUIRED CORE COURSES

### BUA 500 Principles of Business Analytics

Choose 3 courses from the following courses (9 credit hours)

### BUSINESS ANALYTICS ELECTIVE COURSES

BUA 501 Quantitative Analysis  
BUA 502 Data Analysis  
BUA 503 Game Theory, Business Strategy, and Thinking Strategically  
BUA 504 Data Warehousing and Visualization  
BUA 505 Predictive Analytics for Business Strategy  
BUA 506 Developing Value Through Business Analysis Applications  
BUA 507 Ethical Business Decision-Making  
BUA 508 Risk Analytics  
BUA 509 Web Analytics  
BUA 510 Data Science Applications with R or Python  
BUA 511 Data Visualization and interpretation using Tableau  
BUA 512 Business Cognitive Analytics and Applications  
BUA 513 Financial Engineering: Computational and Quantitative Methods  
BUS 516 Principles of quality management  
BUS 518 Applied Statistics  
BUS 520 Emerging technologies for product development  
BUS 521 Management of Technology and Innovation  
BUS 688 Special Topics (1-3 credit hours)  
BUS 689 Independent Study (1-3 credit hours)  
HCM 535 Data Analytics Applications in Healthcare  
HCM 538 Predictive Analytics and Decision Models in Healthcare  
HRM 532 Managing Human Capital using SAP HCM – *ITU/SAP University Alliances*  
HRM 535 Human Resources and Information Technology using SAP HCM\* – *ITU/SAP University Alliances*  
MGT 569 Strategic Operations Management  
MGT 572 High-Technology Entrepreneurship

## ENTERPRISE RESOURCE PLANNING (ERP) (MINOR)

### REQUIRED CORE COURSE

MIS 527 Technology and Operations Management: Creating value  
Choose 3 courses from the following courses (9 credit hours)

### REQUIRED ERP/SAP COURSES:

ACT 603 Accounting Information Systems/ERP – *ITU/SAP University Alliances*  
BUS 688 Special Topics (1-3)  
BUS 689 Independent Study (1-3)

BUS 690 Strategic Management and Business Policy  
ERP 509 Introduction to ERP Systems using SAP - *ITU/SAP University Alliances*  
ERP 510 ABAP - Advanced Business Application Programming - ITU/SAP  
ERP 511 Enterprise Portal technology using NetWeaver - *ITU/SAP University*  
ERP 512 Enterprise procurement processes (MM) - *ITU/SAP University Alliances*  
ERP 513 Sales order management with ERP - *ITU/SAP University Alliances*  
HRM 532 Managing Human Capital using SAP HCM - *ITU/SAP University Alliances*  
HRM 535 Human Resources and Information Technology using SAP HCM\* - ITU/SAP University Alliances  
MIS 545 Data Mining & Business Intelligence using ERP/SAP - *ITU/SAP Alliances*  
MKT 593 Marketing with Digital Perspectives using SAP CRM - *ITU/SAP University Alliances*

## **FINANCIAL ANALYSIS AND RISK MANAGEMENT (MINOR)**

### **REQUIRED CORE COURSE**

BUA 500 Principles of Business Analytics  
  
Choose 3 courses from the following courses (9 credit hours)  
Required Financial Analysis and Risk Management Courses:  
BUA 501 Quantitative Analysis  
BUA 508 Risk Analytics  
BUA 510 Data Science Applications with R or Python  
BUA 513 Financial Engineering: Computational and Quantitative Methods  
BUS 504 Contract Management & Financial Planning  
BUS 518 Applied Statistics  
BUS 688 Special Topics (1-3)  
BUS 689 Independent Study (1-3)  
BUS 690 Strategic Management and Business Policy  
FIN 515 Managerial Finance  
FIN 516 Entrepreneurial Finance  
FIN 517 Financial Institutions  
FIN 518 Financial and Socially Responsible Investing  
FIN 519 Corporate Valuation  
FIN 520 Investment Management  
FIN 521 International Financial Management  
FIN 522 Behavioral Finance  
FIN 523 Macroeconomic Theory  
FIN 525 Econometrics  
FIN 526 International Economics  
FIN 604 Securities Analysis  
FIN 605 Financial Derivatives and Risk Management  
FIN 606 Corporate Finance  
FIN 607 Mergers and Acquisitions

## **HEALTHCARE MANAGEMENT (MINOR)**

### **REQUIRED CORE COURSE**

MIS 527 Technology and Operations Management: Creating value

Choose 3 courses from the following courses (9 credit hours)

## **HEALTHCARE ELECTIVE COURSES**

### **RECOMMENDED COURSES FOR HEALTHCARE**

BIO 510 Ethics in Medical Research  
BUA 500 Principles of Business Analytics  
HCM 509 Scientific Writing and Research for Healthcare  
HCM 510 A Regulatory Overview & Compliance  
HCM 511 Concepts of Healthcare Management  
HCM 513 Innovating Biomedical Technology  
HCM 515 Health Information Technology  
HCM 525 Principles of Managed Care  
HCM 539 Healthcare Marketing

## **HEALTHCARE DEPTH**

BIO 500 Clinical Research Management  
BIO 501 Modern Medicine and Biology  
BIO 506 Biotech industry fundamentals  
HCM 519 Healthcare Ethics  
HCM 529 Mental Health and Wellbeing  
HCM 531 Complementary and Alternative Medicine  
HCM 534 Financial Management for Healthcare Organizations  
HCM 536 High Reliability Healthcare Organizations  
HCM 537 Commercializing Medical Devices, Diagnostics and Biomedical Innovations

## **HEALTHCARE ANALYTICS**

HCM 520 Healthcare Leadership, Patient Safety and Quality Improvement  
HCM 535 Data Analytics Applications in Healthcare  
HCM 538 Predictive Analytics and Decision Models in Healthcare

BUS 688 Special Topics (1-3 credit hours)

BUS 689 Independent Study (1-3 credit hours)

BUS 690 Strategic Management and Business Policy

## **MANAGEMENT INFORMATION SYSTEMS (MIS)**

### **EQUIRED CORE COURSE**

MIS 527 Technology and Operations Management: Creating value

Choose 3 courses from the following courses (9 credit hours)

## **REQUIRED MIS COURSES:**

ACT 603 Accounting Information Systems/ERP  
BUS 520 Emerging Technologies for Product Development  
BUS 521 Management of Technology and Innovation  
BUS 690 Strategic Management and Business Policy  
MGT 572 High-Technology Entrepreneurship  
MIS 537 Management Information Systems  
MIS 538 Business Database Applications  
MIS 539 Business Telecommunications  
MIS 540 Information Resource Management  
MIS 541 Managing Global Information Systems Projects  
MIS 542 Information Systems Innovation  
MIS 543 Human-Computer Interaction  
MIS 544 Business Decision Support Systems  
MIS 545 Data Mining & Business Intelligence using ERP/SAP - *ITU/SAP University Alliances*  
MIS 546 Data Science for Business  
MIS 547 Software Development Process Management  
MIS 548 Knowledge Management

## **PROJECT MANAGEMENT (MINOR)**

### **REQUIRED CORE COURSE**

MIS 527 Technology and Operations Management: Creating value

Choose 3 courses from the following courses (9 credit hours)

#### **Required Project Management Courses**

BUS 500 Project Management Frameworks  
BUS 501 Strategic Planning & Portfolio Management  
BUS 502 Project Management & Leadership  
BUS 503 Project Management - Agile Approach  
BUS 504 Contract Management & Financial Planning  
BUS 506 Process Mapping & Control  
BUS 507 Project Procurement Management  
BUS 509 Leading and Managing Change  
BUS 517 Organization Culture and Diversity  
BUS 518 Applied Statistics  
BUS 521 Management of Technology and Innovation  
BUS 688 Special topics  
BUS 689 Independent Study  
BUS 690 Strategic Management and Business Policy  
MGT 567 Quality Control Management  
MGT 575 Project Management  
MGT 577 Project risk management  
MGT 611 Lean Six Sigma  
MGT 612 Advanced Project Management

## **PROGRAM OVERVIEW**

In the face of increasing competition, it is no longer sufficient to work harder and faster. Companies call upon people with advanced degrees. It is in this context that the International Technological University (ITU) Business Department offers the Doctorate of Business Administration (DBA) in Strategic Innovation degree.

The DBA is a professional doctoral program intended for executives, senior managers, consultants, advanced students, instructors of business and outstanding business practitioners who will continue to be professionally engaged in organizations. ITU bridges the gap between learning and application with our expert professors, industry mentors, and support resources.

The DBA delivers a powerful program designed to create experts in evidence based business problem solving. It enhances critical thinking, analytical skills, and leadership abilities. It also enables the development of management thought, embedded with the application of real-world business principles.

ITU's DBA program is offered as an innovative and flexible blended learning journey, in a global model setting, with live residencies to network with cohort peers, professors, and expert industry mentors.

#### **Advisory Committee**

To guide students through the degree program, an advisory committee of at least three (3) faculty members with appropriate doctoral degrees, and an external mentor with subject matter and industry expertise, will be assigned. The advisory committee also may serve as the Doctoral Capstone Committee (DCC), which may include the Department Chair. The doctoral capstone course advisor will serve as the chair of DCC. The DCC will review the proposed doctoral capstone topic, determine any further changes, and approve the research objective.

## **PROGRAM LEARNING OUTCOMES**

#### **Upon completion of this program, graduates will:**

- » PLO #1: Appraise the theoretical knowledge and relate it to use in business practice. [Mapped to ILOs 3, 6]
- » PLO #2: Relate appropriate research methodology to evidence based business decision-making. [Mapped to ILOs 1, 2, 5, 7]
- » PLO #3: Devise competencies for managing technology, innovation, and organizational change. [Mapped to ILOs 1, 2, 5, 7]
- » PLO #4: Identify strategies to solve business

## **DOCTOR OF BUSINESS ADMINISTRATION PROGRAM**

challenges within a global context. [Mapped to ILOs 1, 2, 3, 4, 7]

- » PLO #5: Formulate original research, which includes research design, tools and structure. [Mapped to ILOs 3, 5, 6]

## PROGRAM COMPETENCIES

Learning Competencies (LCs)	Doctor of Business Administration PLOs
LC 1: Research Ability	<p><b>PLO #1:</b> Appraise the theoretical knowledge and relate it to use in business practice. [Mapped to ILOs 3,6]</p> <p><b>PLO 2:</b> Relate appropriate research methodology to evidence based business decision-making. [Mapped to ILOs 1, 2, 5, 7]</p> <p><b>PLO 5:</b> Formulate original research, which includes research design, tools and structure. [Mapped to ILOs 3, 5, 6]</p>
LC 2: Data Driven Decision Making	<p><b>PLO 2:</b> Relate appropriate research methodology to evidence based business decision-making. [Mapped to ILOs 1, 2, 5, 7]</p> <p><b>PLO 4:</b> Identify strategies to solve business challenges within a global context. [Mapped to ILOs 1, 2, 3, 4, 7]</p>
LC 3: Leadership	<p><b>PLO 3:</b> Devise competencies for managing technology, innovation, and organizational change. [Mapped to ILOs 1, 2, 5, 7]</p> <p><b>PLO 4:</b> Identify strategies to solve business challenges within a global context. [Mapped to ILOs 1, 2, 3, 4, 7]</p>
LC 4: Focused Knowledge (Strategy & Innovation)	<p><b>PLO 1:</b> Appraise the theoretical knowledge and relate it to use in business practice. [Mapped to ILOs 3, 6]</p> <p><b>PLO #3:</b> Devise competencies for managing technology, innovation, and organizational change. [Mapped to ILOs 1,2,5,7]</p>

## PROGRAM REQUIREMENTS

### PEREGRINE INBOUND AND OUTBOUND EXAM

All DBA students are required to take the Inbound and Outbound exam with Peregrine Academic Services. The Inbound Exam should be taken in the first (1st) trimester of the DBA Program. The Outbound Exam should be taken in the sixth (6th) trimester, before the student starts working on their Culminating Experience (CE) course.

The Inbound and Outbound exams have a fee of \$40 per exam, per student (the fee is subject to change).

The Inbound and Outbound exams are REQUIRED and not OPTIONAL.

In addition, students are required to complete an

APA Write & Cite course from Peregrine Academic Services. The price per student for the course is US \$49.

For more information about the Peregrine Exams, and the APA Write & Cite course, visit the [DBA IN-BOUND AND OUTBOUND EXAMS webpage](#) and the course description for DBUS 806 respectively.

Peregrine Inbound and Outbound Exams Registration Instructions:

Please follow the on-screen instructions found at the

following URL:  
<https://micro.peregrineacademics.com/itu>

### Learning Styles

The world is becoming increasingly connected with technological advances and social media. More than ever before, people are increasingly aware and interested to learn about technology, and its interactions with various aspects of global business.

In order to accommodate the needs of the people resident in the U.S. and across the globe, ITU offers the DBA program in a global, blended learning format.

#### **Why does ITU offer the DBA in a global model?**

- ITU is well known for its global education. We believe in diversity and inclusion as an enriched learning opportunity. We offer high quality education, as endorsed by accrediting institutions (WASC and ACBSP).
- Based on a growing need for a DBA among professionals who do not have the time to commute to campus, ITU provides this doctorate in strategic innovation in a global, blended format.
- The blended learning format provides access for students around the world to undertake doctoral study in a manner that provides for intensive classroom education, team projects, and distance learning technologies in an integrated manner.
- We wish to reach everyone across the globe with this opportunity to be ITU doctoral graduates.

#### **PROGRAM STRUCTURE**

The DBA in Strategic Innovation program may be completed in a minimum of three (3) years and a maximum of eight (8) years.

To be awarded the degree of DBA in Strategic Innovation, you must successfully complete forty eight (48) credit hours including the following:

1. **Coursework:** Thirty nine (39) credit hours of coursework,
2. **Contribution to the field of business research:** (a) Seminars and/or Conferences, (b) Comprehensive Candidacy Portfolio (CCP),
3. **Culminating Experience (CE):** Nine (9) credit hours of Culminating Experience (CE), AND,
4. **Residencies:** The DBA program requires four (4) residencies as follows:
  - a. **Residency 1:** At the beginning of Term 1 of Year 1;
  - b. **Residency 2 and 3:** At the end of Term 3 of Year 1 and 2, and at the beginning of Term 1 of Year 2 and 3; AND
  - c. **Residency 4:** At the end of Term 3 of Year 3.

#### **TRANSFER CREDITS**

ITU Business Department will accept up to 12 credit hours to be transferred from Doctoral Programs from an accredited university. The transfer credits will be contingent upon an assessment of fit with ITU's DBA curriculum. The Chair of the Business Department will make the decision and approve the transfer credits.

#### **1. Coursework**

##### **(i) Core Courses**

6 courses for a total of 18 credit hours

DBUS 800 Quantitative Research Analysis I (3 credit hours)

DBUS 801 Quantitative Research Analysis II (3 credit hours)

DBUS 802 Qualitative Research Analysis I (3 credit hours)

DBUS 803 Qualitative Research Analysis II (3 credit hours)

DBUS 804 Data Analytics I (3 credit hours)

DBUS 805 Data Analytics II (3 credit hours)

DBUS 806 Peregrine APA Write & Cite (0 credit hours)

##### **(ii) Innovation Specialization Courses**

3 courses for a total of 9 credit hours

DBUS 810 Financial Engineering and Innovation (3 credit hours)

DBUS 811 Innovation and Digital Transformation (3 credit hours)

DBUS 812 Strategy for Disruptive Innovation (3 credit hours)

##### **(iii) Research Interest Courses**

2 courses for a total of 6 credit hours

DBUS 700 Behavioral Marketing, Digitization, and Decision Making (3 credit hours)

DBUS 701 Innovation in Business Transformation and Entrepreneurship

##### **(iv) Key Competency Courses**

2 courses for a total of 6 credit hours

DBUS 820 Theoretical Frameworks in Strategy Research (3 credit hours)

DBUS 821 Research Design (3 credit hours)

#### **2. Contribution to the field of business research**

##### **Seminars and/or Conferences**

DBUS 710 Special Interest Seminars and/or Conferences (0 credit hours)

Students should complete at least four (4) Seminars and/or Conferences (free or paid) in the area of their research interest. Students should start attending seminars and/or conferences from the very start of their doctoral program. The requirements for seminars and/or conferences must be completed prior to the final CCP presentation (i.e. DBUS 822), which will occur in the third residency.

Students may attend more than four seminars and/or conferences based on their interest. However, Students should choose topics in the area that strengthens their CE research interest and their CCP.

For each seminar and/or conference attended, students must write a paper. In the course DBUS 710, which will be conducted in the last trimester of the second year of the program, students are required to upload on EMS, the papers prepared from attending the seminars and/or conferences. Confirmation of registration for these events must also be included as part of the documents uploaded on EMS.

#### **Comprehensive Candidacy Portfolio (CCP)**

DBUS 711 CCP Panel Presentation I (0 credit hours)

DBUS 813 CCP Panel Presentation II (0 credit hours)

DBUS 822 CCP Final Panel Presentation (0 credit hours)

The student from the start of his/her doctoral program develops the CCP, under the guidance of the doctoral supervisor(s) and/or mentor(s) in three stages. The CCP represents a student's goals, plans, and accomplishments in coursework, special topics, learning from seminars and/or conferences, research and work experiences.

The process includes three (3) presentations by each student to a committee, which includes the faculty teaching the DBA courses at the time of presentation and/or the external mentor.

These presentations will be scheduled as follows:

- CCP Presentation I – Term 2 of Year 1
- CCP Presentation II – Residency 2
- CCP Final Presentation – Residency 3

The goal of the CCP is to ascertain the student's capability to conduct doctoral business research. The portfolio must be aligned with the student's topic of research in the Culminating Experience (CE). Therefore, the student is required to receive a "Pass" decision from the committee in order to progress to the CE phase of his/her degree. Upon successful completion of the coursework and the CCP, the candidate will start working on his/her CE.

Each capstone course consists of three (3) sections for a total of 9 credit hours

DBUS 901 - 1 Doctoral Capstone Research 1 (3 credit hours)

DBUS 901 - 2 Doctoral Capstone Research 2 (3 credit hours)

DBUS 901 - 3 Doctoral Capstone Research 3 (3 credit hours)

OR

DBUS 902 - 1 Doctoral Capstone Project 1 (3 credit hours)

DBUS 902 - 2 Doctoral Capstone Project 2 (3 credit hours)

DBUS 902 - 3 Doctoral Capstone Project 3 (3 credit hours)

OR

DBUS 903 - 1 Doctoral Capstone Publishable Papers 1 (3 credit hours)

DBUS 903 - 2 Doctoral Capstone Publishable Papers 2 (3 credit hours)

DBUS 903 - 3 Doctoral Capstone Publishable Papers 3 (3 credit hours)

Each of these courses requires the candidate to work on his/her doctoral proposal.

#### **DOCTORAL CAPSTONE PROPOSAL**

This is a formal written proposal, which must include a clear statement of the problem to be researched and a survey of the relevant literature. The proposal must specify the research methods, data collection, and data analysis techniques in detail. The methods to be employed must be appropriate, reliable, and appropriate for the measures taken. A candidate intending to complete his/her DBA degree within three years is required to present and defend the doctoral capstone proposal to the DCC at the end of the first (1st) term of the third (3rd) year. In the event the DCC recommends additional work on the proposal, the candidate will have one more chance to present and defend his/her doctoral proposal, no later than six (6) months from the original presentation.

#### **DOCTORAL CAPSTONE DEFENSE**

Upon successful presentation of the doctoral proposal, the candidate will progress to the development of his/her chosen doctoral capstone (DBUS 901, 902, or 903). The candidate will be required to defend his/her final doctoral capstone in the presence of the DCC. The final capstone document(s) must be made available to all members of the DCC one (1) month prior to the defense.

The oral defense will take place in the final term of

#### **Culminating Experience (CE)**

Candidates must choose one of the following three (3) doctoral capstone courses. Each of these courses is equal in terms of academic rigor.

- Doctoral Capstone Research (DBUS 901), OR
- Doctoral Capstone Project (DBUS 902), OR
- Doctoral Capstone Publishable Papers (DBUS 903) (3 publishable papers)

the third (3rd) year. It shall consist of a presentation of the research results and a question and answer (Q&A) session following the presentation. The defense is open to the public, but only members of the DCC have a vote. The doctoral capstone defense passes through unanimous voting.

## THE FOLLOWING TABLE PRESENTS THE DBA IN STRATEGIC INNOVATION PROGRAM ROADMAP

DBA IN STRATEGIC INNOVATION (GLOBAL MODEL) PROGRAM ROADMAP															
Year	FALL (15 weeks)				SPRING (15 weeks)				SUMMER (15 weeks)				SEP 1 week (last week)		
	OCT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP		
	1st week	3 weeks	4 weeks	3 weeks	4 weeks	2 weeks	2 weeks	4 weeks	4 weeks	2 weeks	5 weeks	4 weeks	3 weeks		
1	RESIDENCY	A. Peregrine Inbound Exam				B. DBUS 801 (QUANT 2)				C. DBUS 803 (QUAL 2)				RESIDENCY	
	1. Orientation	B. DBUS 800 (QUANT 1)				C. DBUS 802 (QUAL 1)				D. DBUS 711 (CCP Presentation I)				1. Complete DBUS 810, DBUS 700, 2. Start DBUS 804, DBUS 821	
	2. Start of DBUS 800, 3. Start of DBUS 802													3. DBUS 813 (CCP Presentation II), 4. DBUS 901/902/903 (CE Discussions)	
	4. Introduction of DBUS 710, DBUS 711 (CCP), DBUS 901/902/903 (CE)	D. DBUS 806 (Peregrine APA Write & Cite)													
2	RESIDENCY	A. DBUS 804 (DATA 1)				B. DBUS 811 (INNOVATION)				C. DBUS 812 (DISRUPTIVE INNOVATION)				RESIDENCY	
	1. Complete DBUS 810, DBUS 700 2. Start DBUS 804, DBUS 821													1. Complete DBUS 812, DBUS 701	
	3. DBUS 813 (CCP Presentation II), 4. DBUS 901/902/903 (CE Discussions)	B. Start DBUS 821 (RESEARCH DESIGN)								C. DBUS 710 (Submission to EMS of Seminars & Conferences)				2. Start DBUS 820, 3. DBUS 901/902/903 (CE Discussions & Proposal)	
3	RESIDENCY	A. DBUS 820 (STRATEGIC RESEARCH)				B. DBUS 901/902/903 - 1 (CE)				D. Peregrine Outbound Exam				4. DBUS 822 (Final CCP Presentation)	
	1. Complete DBUS 812, DBUS 701 2. Start DBUS 820, 3. DBUS 901/902/903 (CE Discussions & Proposal)													RESIDENCY	
	4. DBUS 822 (Final CCP Presentation)	C. CE Proposal Defense				A. DBUS 901/902/903 - 2 (CE)								1. CE Final Defense	
						A. DBUS 901/902/903 - 3 (CE)								2. Graduation Ceremony	

DBA GLOBAL MODEL - RESIDENCY ITENERARY														
YEAR 1				YEAR 2				YEAR 3						
FALL	BREAK	SPRING	BREAK	SUMMER	FALL	BREAK	SPRING	BREAK	SUMMER	FALL	BREAK	SPRING	BREAK	SUMMER
First week of October				Last week of September	First week of October				Last week of September	First week of October				Last week of September

### REFERENCE

Peregrine Exams & Course
Blended Learning Courses
Residencies
Distance Learning Courses
Culminating Experience Courses

Details of each reference item is contained in the DBA Curriculum

### BLENDED LEARNING FORMAT

The DBA in Strategic Innovation (“On Campus” and “Global” models) is offered in a Blended Learning Format. Our Blended learning courses include the usage of the internet and the students’ computing devices to access class, and/or course content, and interactions with faculty, and their peers.

The blended learning format has two (2) distinct components: face-to-face, and distance learning interactions. Blended learning allows students to obtain the relevant course information at a time and place suitable to them, beyond constraints of time and geography.

The courses within the DBA program with the global model will follow the rigor and format of ITU’s DBA on-campus program. Our courses are offered in three (3) terms; Fall, Spring, and Summer with 15 weeks of teaching. However, for orientation purposes, and to provide students with the opportunity to

meet with their peers and faculty at the start of the program, the DBA in the global model will start with one week of residency in the first week of the start of the program.

### TECHNOLOGICAL REQUIREMENTS

As part of their doctoral study, students are required to have access to a personal computer. ITU makes no demands on what type of computer or device students must have. However, students will need to have word processing software such as Microsoft Word installed on it. In addition, students will require presentation and data analysis software such as Microsoft PowerPoint, and Microsoft Excel respectively. In addition, as part of coursework, students will be required to install statistical analysis software such as SPSS, and/or run code (in languages such as R/Python) for data analytics purposes.

## **COURSE DESCRIPTIONS**

### **ACT (ACCOUNTING)**

#### **ACT 500 FINANCIAL ACCOUNTING (3)**

Prerequisites: None

This course provides an introduction to basic theory and methods of financial accounting. It is designed to offer managerial users the foundations of accounting concepts. The course helps the students understand financial statement information. Focus will be on accounting for assets (e.g., Accounts Receivable, Inventories, Property, Plant and Equipment, Intangible Assets), liabilities (e.g., Bonds, Deferred Taxes) and owners' equity. Focus will be also on the presentation of the income statement through Net Income, revenues and expenses. Class sessions develop the understanding of the different steps of the accounting cycle, and of the financial statements that give the managers the ability to use them for decision-making.

#### **ACT 501 FORENSIC ACCOUNTING (3)**

Prerequisites: None

This course explores the forensic accountant's role in today's economy. The course is designed to enhance a student's understanding of the emerging field of forensic accounting. The course is structured to enhance the ability of students to think critically and to develop the knowledge, skills and attitudes necessary to compete effectively in the rapidly changing world of accounting using the traditional method of detecting fraud and using the current technology. By the end of the course, students should be able to understand the causes of fraud and white-collar crime, examine the types of fraud and fraud schemes, explore methods of deterring and detecting fraud, and examine the financial impact to businesses and the economy.

#### **ACT 502 INTERNATIONAL ACCOUNTING (3)**

Prerequisites: None

The knowledge of accounting requirements and the influence of environmental factors on accounting systems both nationally and internationally becomes important to the accounting professional. Topics of financial accounting for international operations, multinational managerial accounting and control, comparative international accounting, international reporting issues, and international taxation are examined. The focus of the course is to solve the problems related to accounting for multinational corporations doing business in a global environment. This course covers the topics of currency translation and foreign currency gains and losses and accounting for international accounting organizations.

#### **ACT 504 TAX ACCOUNTING PRINCIPLES (3)**

Prerequisites: None

This course introduces federal tax law, including the preparation of individual income tax form 1040 and related schedules. Tax accounting principles, such as the measurement of income, asset exchanges, capital transactions, and business expenses are examined. Topics include corporate income tax, subchapter S, dividends, and liquidating distributions. The course also provides tax knowledge through identification of significant differences between tax and financial accounting.

#### **ACT 600 MANAGERIAL ACCOUNTING (3)**

Prerequisites: ACT 500, or basic knowledge of accounting  
This course introduces the students to the principles of managerial accounting, which is the internal use of accounting information to manage modern firms, including planning, analysis, and decision-making. This course focuses on information generated by internal accounting information systems to evaluate organizational performance, methods to evaluate financial alternatives, and create financial plans. Topics will include interpretation of financial statements, cost behavior, cost allocation, budgets and cost control. Other topics such as decentralization, product costing, job and process costing, break-even analysis, and absorption costing will also be discussed.

#### **ACT 601 COST ACCOUNTING (3)**

Prerequisites: ACT 500, or basic knowledge of accounting  
This course applies cost accounting concepts and accounting tools to make management decisions. Students learn to use cost accounting to evaluate and make strategic business formulation, research and development, budgeting, production planning, pricing, and provide information for management accounting and financial accounting. Other topics include financial statements, concept of depreciation and inventory methods, cash flows, business valuation, working capital, cost behavior, cost allocation, budgets, and control systems.

#### **ACT 602 INTERMEDIATE ACCOUNTING (3)**

Prerequisites: ACT 500, or basic knowledge of accounting  
This course will provide a comprehensive review of the accounting process that discussed in Financial Accounting (ACT 500). Students will learn and deepen their understanding of the preparation of classified financial statements. Students will also learn other information and apply analytical tools in making both business and financial decisions. This course will also include topics related to cash flows, accounting for a company's financing and investing activities and related tax accounting; primary current assets, current and long term liabilities; amortization of bond premiums and discounts, journal entries associated with issuance of preferred, common stocks, and treasury stocks, and declaration of dividends; owners' equity and earnings per share; and time value of money. Students will study how to record various financial transactions and understand the impact on the usefulness of the information provided for decision-making. During coverage of these topics, discussion will include a development of the understanding of full and fair disclosures based on GAAP, ethical and moral implications, and the related concept of transparency.

#### **ACT 603 ACCOUNTING INFORMATION SYSTEMS/ERP (3)**

ITU/SAP University Alliance

Prerequisites: ACT 500, or basic knowledge of accounting  
This course addresses the development and use of accounting information systems for managerial control and external reporting, focusing on reporting objectives, management needs, documentation, security, and internal controls. The course will cover concepts and principles of financial accounting fundamentals and how to identify measure and report on the financial effects of economic events on enterprises. Topics include accrual accounting concepts; preparation, understanding and analysis of financial statements; accounting for sales and cost of sales and procurement of materials.

The course will focus on designing computer systems to perform accounting functions, and extensive use of applications of different microcomputer accounting software packages.

This course will prepare the student to understand the basic structure and procedures of financial and management accounting in the SAP System and to maintain master data and perform essential function in General Ledger, Account Payable, Account Receivable, Cost Center Accounting and Internal Orders and to describe how Financial and Management Accounting interact with other in SAP process. The course will be covered in 6 weekend classes as per the schedule. The course is presented in lecture format and hands-on problem solving exercises.

### **ACT 604 AUDITING (3)**

Prerequisites: ACT 500 or basic knowledge of accounting  
This course covers Generally Accepted Auditing Standards (GAAS) as they apply to the study of audit preparation and procedures, creating working papers, and audit write-up. In addition, the financial statement audit for entities that are not regulated under Sarbanes-Oxley Act 2002 will be addressed. The course also covers internal and external audit procedures and a comprehensive study of professional auditing ethics, legal, and professional responsibilities, auditing planning, risk assessment, internal control, audit evidence, completion and reporting.

### **BIO (BIO-MANAGEMENT)**

#### **BIO 500 CLINICAL RESEARCH MANAGEMENT**

**(3)**

Prerequisites: Any Biology background: Academic or Professional

This course is designed to create an in-depth understanding of the clinical research methodologies including the regulatory aspects of clinical research. This course will help you to understand and apply scientific principles to the implementation of clinical research whether it is investigator-initiated, or industry-sponsored study. The student will learn to design and present a concept sheet for a Phase I/II and Phase II/III clinical trial. Also addressed in this course are different types of study design, their relative strengths and limitations, and proper choice of study design. The student will also learn to systematically implement the research protocol and evaluate the integrity of the clinical research outcome. In this course, students learn to apply knowledge of data management, information management and scientific communication. Students will explore opportunities to demonstrate professionalism and accountability in the implementation of research studies through applying management.

### **BIO 501 MODERN MEDICINE AND BIOLOGY (3)**

Prerequisites: None

In this course, students will explore the cross-pollination of ideas and advances in biology and how they transform medicine, both at the bedside and in drug development. Many of the advances in biology have radically transformed the understanding of disease states and how medicine is practiced. For example, genomic sequencing is now being widely adopted as a method for diagnostics as well as for drug development. Bioinformatics is another area where huge data management and mining is paving way to understand the complex biological pathways and signaling mechanisms in cells and organs. Other

advance in the field of computer science and algorithm development have been adopted to unravel these complex connections and arrive at a better understanding of cellular and molecular physiology. Physical and mechanical innovations drive devices that have better resolution in the areas of imaging for diagnostics.

### **BIO 506 BIOTECH INDUSTRY FUNDAMENTALS**

**(3)**

Prerequisites: None

This course will introduce students to biotechnology, its principle, and application. A solid knowledge of basic molecular biology is required to gain a complete understanding of the concept and its application. Biotechnology has a broad reach – from agriculture, to biofuels, waste management, medical, forensics, and food. Students will learn to apply modern biological principles and understand the trends in modern medicine, food, and green technologies. By the end of the course, students should be able to critically assess current and future applications of biotechnology in agriculture, drug development and environmental management. This course is a prerequisite course for students in Healthcare Management, and Bio Management streams. Students will benefit immensely if they enroll in this course first before taking any of the other advanced courses. A background in junior-level chemistry and biology is recommended.

### **BIO 510 ETHICS IN MEDICAL RESEARCH (3)**

Prerequisites: None

This course will inform students about the basic principles essential to making educated decisions about ethics in medical research. Understanding the basic principles is critical before conducting clinical research activities. Topics include: historical perspectives, federal regulations, Institutional Review Board (IRB) approval, conflicts of interest, informed consent, the HIPAA Privacy Rule, and AAHRPP accreditation.

### **BUA (BUSINESS ANALYTICS)**

#### **BUA 500 PRINCIPLES OF BUSINESS ANALYTICS (3)**

Prerequisites: Students who are pursuing (1) Business Analytics and (2) Financial Analysis and Risk management concentrations are required to take this course in the first trimester

In this course students will learn the key foundations and tools of Business Analytics and data science. This is a general introductory course that lays the foundations of analysis methodologies for business students in general and is open to all students in the business major. The fundamentals skills that students will learn are: applied understanding of mathematical concepts, hands-on programming skills (Python or R) and preliminary and exploratory data analysis. Students will learn about key ideas in uncertainty modeling using statistics and probability and get exposed to concepts such as random variables, probability distributions, hypothesis testing and descriptive statistics, and linear algebra such as linear spaces and matrix algebra. In the programming section of the course students will gain hands-on experience using popular programming languages used in analysis such as Python. Students will use the mathematical concepts and the programming skills to perform exploratory data analysis on real world data sets.

## **BUA 501 QUANTITATIVE ANALYSIS (3)**

Prerequisites: None

Quantitative analysis course introduces students to the main modeling and simulation strategies in quantitative analysis field with a strong emphasis on practical outcomes which can be directly applied to a business environment. It provides a brief outline of existing theories, technologies and applications which support the modern decision-making process which is to a large extent, data-driven. In this course, students will have an opportunity to work on tools like Excel and advanced add-ons, that helps with performing advanced analysis techniques such as regression and forecasting. Upon completion of this course, students will be able to identify any business problems that can be potentially modeled and simulated and judge whether an optimal solution exists, understand the important issues in their implementation, describe the tools that have been used in the process from their frameworks to the techniques used, determine the business value of outcomes of the quantitative analysis and also appreciate its role in Business Process Management.

## **BUA 502 DATA ANALYSIS (3)**

Prerequisites: None

This course presents the key ideas and the necessary tools to perform data analysis. It lays the foundations of analysis methodologies for all disciplines.

The fundamental skills that you will learn are:

- Applied mathematical concepts (e.g. Linear algebra, linear spaces and matrix algebra),
- Key ideas in statistics (e.g. uncertainty modeling, probability, random variables, hypothesis testing and descriptive statistics), and their applications in data analysis.
- Usage of programming language(s) (e.g. Python or R) for decision making, and implementation of exploratory data analysis and data visualization.

A strong base of data analysis is a key skill that is highly in demand in today's data-driven decision making industry. Data analysis tools and procedures such as data wrangling and exploratory data analysis will help students to assess the quality of the data and its effectiveness in decision making process. You will use Python libraries such as Matplotlib, Numpy and Pandas to perform data analysis, which includes:

- Developing a question
- Formulating the data into a usable format and solving any related problems
- Visualizing and generating insight about the data
- Concluding and/or predicting results
- Presenting outcomes

## **BUA 503 GAME THEORY, BUSINESS STRATEGY AND THINKING STRATEGICALLY (3)**

Prerequisites: None

The focus of this course is the use of game theory to define the most likely outcome of business situations, especially where there is a communication between two or more decision makers to build business strategy. In addition, students will be introduced to methods in strategic thinking and its connections with current game theory to resolve strategic business problems. Students will need skill at numerical reasoning for this course.

## **BUA 504 DATA WAREHOUSING AND VISUALIZA-**

## **TION (3)**

Prerequisites: None

This course discusses the principles of data warehousing, design and implementation along with related software tools.

Topics consists of data warehouse architecture, dimensional model design, physical database design, data integration and visualization, and data warehouse administration. The course also builds core skills for visual study of data among students. Trends and tools in data visualization will be explained with a special focus on recognizing patterns and trends from large datasets. Knowledge in database management recommended.

## **BUA 505 PREDICTIVE ANALYTICS FOR BUSINESS STRATEGY (3)**

Prerequisites: None

This course explains information technology, modeling methods and data sciences to familiarize students with the field of predictive analytics. Prior course work in data warehousing and visualization will add to this course, which builds on assessing data within the business context, understanding data trends and risk assessment. Through this course, students will learn how to build reliable predictive models for developing business strategy geared at organizational competitive advantage.

## **BUA 506 DEVELOPING VALUE THROUGH BUSINESS ANALYSIS APPLICATIONS (3)**

Prerequisites: None

This course discusses the role that the business analysis plays in exploring and visualizing outcomes to create better outcomes, thereby creating organizational value. Students will be equipped with different tools and application knowledge to drive winning stakeholder outcomes through ongoing business analysis.

## **BUA 507 ETHICAL BUSINESS DECISION MAKING (3)**

Prerequisites: None

This course introduces the ethical issues involved in the "big data" world and its effects on strategic business decisions. In studying real life case studies, existing practices and issues with developing trends, students understand the ethical dilemmas related to data identity, privacy, ownership and organizational reputation. This in turn will prepare the students to make more informed and ethical decisions related to organizational data.

## **BUA 508 – RISK ANALYTICS (3)**

Prerequisites: None

This course builds statistics and data modeling with a focus on risk theory and management. Students gain exposure to present trends in enterprise risk logical methods. This enables students to understand and implement risk management structures in the organizational environment. Major risk categories such as financial risk, strategic risk and operational risk will be covered along with analytical methods to these risk groups.

## **BUA 509 – WEB ANALYTICS (3)**

Prerequisites: None

The Internet is one of most powerful tools of business today. This course develops practices to analyze qualitative and quantitative data from website. Related topics,

such as text mining and web mining will also be covered. In addition, this course provides students with the tools to drive constant enhancement of online experiences to customers; both current and future. Topics include Google Analytics and A/B Testing. Incoming traffic characteristics such as client browser, language, computer attributes and geolocation will also be covered.

### **BUA 510 DATA SCIENCE APPLICATIONS WITH R OR PYTHON (3)**

Prerequisites: BUA 500 or 502, or Equivalent

This course focuses on implementation of business analytics problems using a structured programming language such as R or python. Examples of descriptive and predictive business analytics problems such as linear regression, decision analysis, forecasting will be used and implemented using R and Python programming languages. Basic ideas of implementation of an algorithm in R, are discussed. Concepts such program I/O, reading data and visualization of the data, exceptions, conditional statements and statistical packages will be discussed. The course emphasizes hands-on experience and implementation of business analysis ideas in R and Python using pre-existing libraries. It is recommended that students be familiar with basic ideas in statistical modeling and business analytics to maximize the learning outcome of this course.

### **BUA 511 Data Visualization and interpretation using Tableau (3)**

Prerequisites: None

One of the key skills required for business analytics is the ability to communicate the results of data-driven analysis to non-technical decision makers. To effectively communicate a complex analysis that results in actionable advice one needs to be familiar with the factors that impact decision makers. In this course you will learn how to become a master at communicating business-relevant implications of data analyses. After finishing this course you will be able to effectively import data, clean and transform it and convey the results of the analysis to the stakeholders. You will also know how to streamline your analyses and highlight their implications efficiently using visualizations in Tableau, the most popular visualization program in the business world. Using other Tableau features, you will be able to make effective visualizations that take advantage of innate perceptual and cognitive tendencies of a human brain to convey conclusions directly and clearly.

### **BUA 512 BUSINESS COGNITIVE ANALYTICS AND APPLICATIONS (3)**

Prerequisites: BUA 500 or 502, or Equivalent

This course focuses on advanced topics in Cognitive Analytics. After completion of this course students will become familiar with the analysis of case studies from large companies such as Amazon, Walmart, and Facebook and how they use advanced business analytics techniques to effectively perform market segmentation, targeted marketing and supply chain management. With the abundance of unstructured and unlabeled data from social media, e-commerce website, companies are using data-driven analytics to understand the patterns in customers' reaction to introduction of new products and their preferences. Content management marketing, content generation and optimum supply chain strategies will be some of the business application areas that the new techniques will be applied. Students will learn the implementation of

these advanced techniques in business decision making using some of the tools they have already learned in the previous business analytics classes.

### **BUA 513 FINANCIAL ENGINEERING: COMPUTATIONAL AND QUANTITATIVE METHODS (3)**

Prerequisites or concurrently: FIN 534 or equivalent

Mathematically sophisticated financial models are the foundation of a successful CFO, investment banker or investment managers. For example, valuing the call provision in a callable convertible bond is important to the CFO of the issuing company (who decides whether or not to include the call provision in the issue). This course focuses on the mathematical foundations used in financial engineering and implementation of these concepts using Python and the relevant computational finance libraries. The students will learn about quantitative methods used in financial engineering and cover topics such as Black-Scholes-Merton Model, Levy Model, volatility models, multi-asset models, European and US option pricing models, Monte-Carlo Simulation for Put Option modeling, Bond valuation and Hedging.

This course offers an understanding of the latest financial tools and products, of the recent developments and rational of Risk and Risk Management, used to hedge equity, currency and interest rate risk in key financial markets.

The course will also highlight methods to assess and measure the financial risk.

### **BUA 690 SIMULATION AND OPTIMIZATION FOR BUSINESS ANALYTICS (3) - CAPSTONE COURSE**

Prerequisites: MGT 503, MKT 551; Completion of 27 credit hours in the program

Decision making is a critical part in any business. Business Analytics provides solutions to businesses worldwide with the advanced analysis techniques and tools. Optimization and simulation are two such methods that are being used in many business environments that involve decision making. In this course students will be able to examine and identify the classical and modern optimization techniques used in today's business environment. Few areas where these techniques can be used are selection of portfolio in finance, transportation industry, resource allocation of any industry, and minimizing the advertising cost in marketing. Focused on linear and the nonlinear programming techniques and their application in business environment and modern simulation and optimization techniques, this course helps students understand the need and use of decision making using these techniques.

### **BUS (BUSINESS)**

### **BUS 500 PROJECT MANAGEMENT FRAMEWORKS (3)**

Prerequisites: None

This course is designed to be the main structure related to the Project Management fundamentals for students who look to understand, practice, and improve the project execution process. This is based on the best practices and methods of project management implemented, such as PRINCE, PMI, PMBOK, and Microsoft Framework. This is to run projects in an agile organization toward effective implementation and efficient achievements.

## **BUS 501 STRATEGIC PLANNING & PORTFOLIO MANAGEMENT (3)**

Prerequisites: None

This course is designed to interpret the strategic values and vision of the enterprise's portfolio management. The process is to recognize the company plan and strengthens its service offered in strategic business plan. The course's objective is to explain how a Project Management Oriented Business is able to divide the strategic planning into operational goals, which are attained by each division. Service analysis measures performance in the light of the company strategy and the business environment, with the goal of choosing and performing services that generate greatest value while incurring least risk for the business.

## **BUS 502 PROJECT MANAGEMENT & LEADERSHIP (3)**

Prerequisites: None

This course is an overview of project management with an emphasis on leadership and team building. The first part focuses on the traits of successful leaders and the dos and don'ts for building effective teams. The second part introduces the project management framework and the different steps of the project management process. The third part describes how leadership practices can affect key management aspects of the project, such as scope, time, cost, human resources, stakeholders and communications. This course will also provide the basic knowledge necessary to prepare for the ASQ CQIA, ASQ CMQ, PMI CAPM or PMI PMP certification examination. Students who sign up for these exams will receive extra credit for their final grade.

## **BUS 503 PROJECT MANAGEMENT - AGILE APPROACH (3)**

Prerequisites: None

This course provides students with the knowledge and tools to manage projects using the agile project management framework. Students will learn topics such as developing the project vision, identifying user roles and stakeholders, chartering teams, planning releases, assigning value, and managing communication, quality, risk, and change.

This course is designed to provide students with skills to manage all types of projects (e.g. software, and products). It is also applicable to project managers transitioning from traditional management environments to agile methodologies. The focus of this course is on the conceptual understanding that students need to know in order to successfully manage projects in a fast paced technical environment.

## **BUS 504 CONTRACT MANAGEMENT & FINANCIAL PLANNING (3)**

Prerequisites: None

This is a practical course about designing contracts and analyzing the project budget related to milestones achievement and deliverables scheduling. Students will learn about the project scope and implementation phases that are needed to design the required activities and charter agreement. In addition, they will learn about the Project/Program Evaluation and Review Technique (PERT), Planned Value (PV), Earned Value (EV), Actual Cost (AC), Budget At Completion (BAC), Estimate To Complete (ETC), Estimate At Completion (EAC), and Vari-

ance At Completion (VAC).

## **BUS 506 PROCESS MAPPING & CONTROL (3)**

Prerequisite: None

This course is a practical course that puts students in the lab of analyzing and designing the structure of operation and implementation. It talks about enterprise architecture and process mapping that is needed in Project Management and Management Engineering & Restructuring. This is to give advanced analytical skills and mechanisms toward designing and drawing the operation scheme based on Computer Assisting Software Engineering (CASE). On the other hand, it shows the monitoring and control tools needed to maintain, handle and control the projects or/ and program structure for systematized implementation.

## **BUS 509 LEADING AND MANAGING CHANGE (3)**

Prerequisites: None

This class will focus on individual, team, and organizational leadership and will provide students with the foundation for exploring and developing their own individual leadership style. Major areas to discuss are leadership, values, ethics, and decision-making. Change and a leader's goal is to continually improve and look forward and provide the positive changes for the organization; being the visionary is critical to success in any organization and a key attribute for any organizational leader.

## **BUS 510 REGULATION, GOVERNANCE, ETHICAL AND SOCIAL RESPONSIBILITY (3)**

Prerequisites: None

The overall goal of this course is to better prepare students to become responsible business leaders. In this class, students explore the relationship between business and society, and argue that to create a business that will endure business leaders must take into account the needs of the broader society, as well as those of their employees and other stakeholders. The major areas of study in this class will include: business ethics, the legal regulation of business, corporate governance, and corporate social responsibility.

## **BUS 516 PRINCIPLES OF QUALITY MANAGEMENT (3)**

Prerequisites: None

This course covers the philosophy and concepts of quality management with an emphasis on tools and techniques of quality management for continual improvement in quality and productivity. Students learn techniques to improve organization performance and competitiveness.

## **BUS 517 ORGANIZATION CULTURE AND DIVERSITY (3)**

Prerequisites: None

As organizations become increasingly diverse, the importance of understanding diversity, and its influences in the organizational culture become more essential. This course offers students a thorough understanding of diversity, beyond cultural diversity. Students planning to be managers and leaders of global organizations will learn in this course how to build and implement broad organizational diversity plans. In addition, students will become aware of the legal and ethical effects of building diverse initiatives and of the factors that build an effective organizational

culture.

### **BUS 518 APPLIED STATISTICS (3)**

Prerequisites: None

The course covers topics from both introductory and advanced level courses in statistics with the purpose of preparing students for classes in Business Analytics and Data Mining, and also for students who expect to be using statistics for their research. The course is designed to cover foundation topics in the first one-third of the classes, and classical multivariate statistical methods in the second two-thirds. The introductory part cover topics as: probability theory, distributions on different types of random variables, sampling and sampling distributions, hypothesis testing, statistical inferences, one and two-sample procedures, assessing goodness of fit, analysis of variance, linear least squares, correlation and regression, sample size, analysis of variance, and non-parametric statistics. The topics covered in the latter 2/3 of the course are classical multivariate methods and cover topics as: multivariate normality, comparison of multivariate means, matrix algebra, principal component analysis, discrimination and classification, linear multivariate regression, analysis of co-variance, canonical correlation.

Optional topics are support vector machines, and model evaluation and selection. Also, Bayesian statistics is of interest for its widespread use. Upon completion of this course, the students is expected to demonstrate an understanding of the principles of probability theory in classical multivariate statistical analyses, and should be able to think critically about data and models, and to draw conclusions from such analyses.

### **BUS 520 - EMERGING TECHNOLOGIES FOR PRODUCT DEVELOPMENT (3)**

Prerequisites: None

This course discusses emerging technologies in the area of product development. Ongoing economic constraints, declining margins, volatile supply chains and other market factors have been instrumental in hastening the adoption of technologies in industries seeking sustained competitive advantages. Concepts discussed in the context of product development are critical thinking for problem definition, resource utilization, optimization and allocation, managing variability in development work, understanding and managing economic performance measures, capacity management, quality management and harnessing people and technology for successful product development. Emerging technologies range from innovations in ERP systems, Internet of Things, Virtual Reality, 3D Printing, and the use of Artificial Intelligence for product design and technical specifications. Lastly, Big Data Analytics will be briefly discussed in relation to creating customized product solutions and reinventing the value chain in the quest for ongoing competitive advantage.

### **BUS 521 – MANAGEMENT OF TECHNOLOGY AND INNOVATION (3)**

Prerequisites: None

Technology and Innovation are the two pillars of the world we live in. This course will teach students about managing both technology and innovation for sustained competitive advantage and value creation. Through understanding the interconnected nature of technology and innovation, students will understand the impacts of

well-managed technology and innovations on other allied concepts such as wealth creation, social and human capital, and knowledge management among others. Lastly, and importantly, this course aims to provide students tools to manage technology and innovation beyond conventional methods using case studies and other strategic frameworks.

### **BUS 600 RESEARCH METHODS (3)**

Prerequisites: None

This course introduces students to research methodology with focus on statistical techniques and the interpretation of results. Students will be provided with the foundation to understand and apply research methods via class lectures and hands-on practice. Students will perform literature search and review, create a working research model and hypotheses, compile a questionnaire, use multivariate statistics to analyze data, and form conclusions based on the results.

### **BUS 688 SPECIAL TOPICS (1-3)**

Prerequisites: None

This course offers a relatively new subject that is not currently available in the catalog, but will be of great relevance to Business Administration. It consists of lectures, readings, homework, presentations and projects determined by the instructor.

### **BUS 689 INDEPENDENT STUDY (1-3)**

Prerequisites: None

Independent Study allows students to explore academic areas of special interest not provided in the existing curriculum. It is carried out under the guidance of a member of the faculty.

### **BUS 690 STRATEGIC MANAGEMENT AND BUSINESS POLICY (3)**

Prerequisites: MGT 503, FIN 534, MIS 527, MKT 551, BUA 500 and MGT 578 or equivalent

This course is an overview of the important aspects of business policy and strategic management. The aim is to explain strategic organizational vision, discuss strategic problems and find solutions, which contain application and procedures of measureable evaluations. Students will learn to use quantitative tools to react to, and predict change, and to think strategically by studying a real world model of the management process. In addition, topics related to relationships between business ethics and strategic management are presented.

This is a capstone course. Topics include case studies on design, creation and application of strategies at different stages of the organization. Reflection on the organizations' control, on their role concerning stakeholders, investors and business environment is included.

Students will need the learning from all core business courses. Strategic Management techniques are a crucial part of the learning in this course in order to chart the future path of organizations. Students are responsible to make strategic decisions based on a review of existing business policy, and they are strongly encouraged to create, or suggest new policies to implement their strategic vision, and to justify them through oral and written communication.

## **BUS (DOCTOR OF BUSINESS)**

### **BUS 700 BEHAVIORAL MARKETING, DIGITALIZATION, AND DECISION MAKING (3)**

Prerequisites: None

This course deals with the understanding of consumer behavior, and consequent organizational decision-making as a result of engagement with target markets in the digital world. Digitization has revolutionized customer engagement strategies. Further, social media is fast emerging as a tool to understand, reach, and retain consumers. In this course, students can expect to learn about marketing decision making through consumer behavior analytics, search engine optimization, social media marketing, 3D Printing and its implications for the marketing function.

### **BUS 701 INNOVATION IN BUSINESS TRANSFORMATION AND ENTREPRENEURSHIP (3)**

Prerequisites: None

This innovative course seeks to equip students with the strategies to transform organizations and entrepreneurial ventures to compete in the emerging global context. The course elaborates on innovation through three pivotal foci - processes, technologies, and people. Key concepts covered in this course include innovating business models, breaking down traditional silos, and developing tools for predictive decision-making. Applying the Silicon Valley entrepreneurial approach to design driven innovation, this course will address venture capital management, strategic leadership, and change and knowledge management.

### **BUS 710 SPECIAL INTEREST SEMINARS AND/OR CONFERENCES (0)**

Prerequisites: None

Attending seminars and/or conferences in the special interest research areas is vital for doctoral students in the program. In this course, students get to network with peers and experts in the areas of their research interest, gain innovative direction for their doctoral capstone, gain traction for future publication, data collection, and much more. As part of their doctoral study, students are encouraged to attend at least four (4) seminars and/or conferences in their area of research, and use their learning to build their comprehensive candidacy portfolio (CCP).

It is the students' responsibility to accurately document their attendances and learning materials from these seminars and/or conferences, and to upload these to ITU's educational management system, EMS.

### **BUS 711 CCP PANEL PRESENTATION I (0)**

Prerequisites: None

This panel presentation is the first in a series of three CCP Panel Presentations. The presentations are aimed at gauging the doctoral student's progress towards their academic and professional goals at critical milestones in their degree.

The main focus of the CCP courses is to include students' work experiences in depth, as well as demonstrate competencies, and strengths in their specialization. Students must include in their portfolio for this course, a statement of their work experiences, and its alignment to their area of research, with a brief summary of the literature of their chosen CE. In addition, students must include a summary of conferences, and seminars that have con-

tributed to their area of research interest.

Students are required to work on any feedback from their committee in order to progress to CCP Panel Presentation II. They are required to submit all materials related to this presentation on ITU's educational management system, EMS.

### **BUS 800 QUANTITATIVE RESEARCH ANALYSIS I (3)**

Prerequisites: None

This course offers topics in survey and experimental design and data; statistical analysis including variance analysis, multiple regression, linear model, and factor analysis; and time series study. Students will learn how to understand the statistical results included in academic papers and articles. In addition, they will learn how to relate these techniques using statistical software through practical analysis of research data sets.

### **BUS 801 QUANTITATIVE RESEARCH ANALYSIS II (3)**

Prerequisites: DBUS 800

This is an advanced course. It aims to equip students with the quantitative research skills required to successfully conduct their doctoral research. In using the state of the art statistical software, students will gain hands on experience in topics such as statistics, probability, forecasting methods, and others. Students will also gain an understanding for the pros and cons of using quantitative methods.

### **BUS 802 QUALITATIVE RESEARCH ANALYSIS I (3)**

Prerequisites: None

This course introduces doctoral students to the qualitative research methods and equip them with the essential skills, practices, and knowledge to start independent research analysis. Topics that will be covered include conceptualization and measurement, ethical research techniques, survey design, content analysis, and field studies. Course assignments will be used to apply the methods learned and complement the theoretical knowledge gained from the lectures.

### **BUS 803 QUALITATIVE RESEARCH ANALYSIS II (3)**

Prerequisites: DBUS 802

This course aims to provide a balance in research techniques to students conducting doctoral research. The course will help students examine the proverbial story behind quantitative data. Key topics include potential biases that might distort data accuracy; developing case studies, interview techniques, interpreting verbal data, and others. Students will also receive hands on training with relevant software for conducting qualitative research analyses. Ethics, best practice, and quality criteria in research will be some underlying tenets.

### **BUS 804 DATA ANALYTICS I (3)**

Prerequisites: None

Analysis of data is an important element of Business decision-making. The aim of the course is to prepare the students to lead in analytics-driven organizations. The course will equip the students with the competences and challenges of data-driven in business decision making.

Data analytics techniques, such as, predictive analytics, data manipulation, decisions under uncertainty, and decision analytics tools will be covered. The course will help the students to understand the process of observing the data to draw conclusions, which are probable by using current tools such as Tableau, SAS, MS Power Business Intelligence(BI), Hadoop, and Excel, among others.

### **BUS 805 DATA ANALYTICS II (3)**

Prerequisites: DBUS 804

The course will enable students to understand the data driven decision making within the context of strategic innovation. Together with Quantitative, and Qualitative Research Analysis, students will learn to interpret, manage and disseminate complex business data. Most importantly, students will understand how to use data as a strategic lever to drive innovation in organizations. Key topics covered include statistical modeling methods, business intelligence, data warehousing, and data mining.

### **BUS 806 PEREGRINE APA WRITE & CITE (0)**

Prerequisites: None

Academic writing is a key competency for doctoral students. This is an online, interactive, eight (8)-module course, provided by external experts, Peregrine Academic Services to help students prepare and succeed in writing their doctoral capstones. Students will learn to write, format, and correctly cite academic work. This course will also specifically empower students to define their research problem, find legitimate sources, and create doctoral capstones that are publication worthy. Students are required to take the pre-course test, as well as a competency exam on completion of the course.

Students are required to take this course in the first trimester of the DBA program. There is a cost of \$49, to be paid to Peregrine Academic Services at the time of registration in this course. Students are also required to upload on ITU's educational management system, EMS, evidence of passing this course.

### **BUS 810 FINANCIAL ENGINEERING AND INNOVATION (3)**

Prerequisites: None

This cutting edge course draws from multiple disciplines such as mathematics, financial theory, engineering, and programming to the practice of finance, asset management, and portfolio management. A key outcome of this course is to apply financial engineering techniques to drive innovations in finance by developing new financial products. Topics examined in this course are portfolio optimization, prediction, estimation, risk analysis, and financial innovation.

### **BUS 811 INNOVATION AND DIGITAL TRANSFORMATION (3)**

Prerequisites: None

This distinctive course focuses on various managerial, technological, and economic factors that drive digital revolution. This course goes beyond creating products and services for the digital world by addressing the need for continued organizational innovation, leading and implementing innovation, strategic R&D, and principles of digital transformation, among others.

### **BUS 812 STRATEGY FOR DISRUPTIVE INNOVATION (3)**

Prerequisites: None

This course deals with the pursuit of competitive advantage in a market that is constantly faced with myriad threats. Here, students will be equipped to analyze business trends all over the world, and identify risks, threats, and opportunities while implementing and managing disruptive innovation. Last, but not least, students will understand the role of disruptive innovation as an integral part of modern corporate strategy.

### **BUS 813 CCP PANEL PRESENTATION II (0)**

Prerequisites: DBUS 711

This panel presentation is the second in a series of three CCP Panel Presentations. The presentations are aimed at gauging the doctoral student's progress towards their academic and professional goals after significant parts of coursework has been completed towards the degree.

As the main focus of the CCP courses is the students' work experiences, students must include a statement of advanced input from their work experiences, and demonstrate significant progress on their literature review related to their chosen CE. They must also include a summary of how their coursework till date has influenced their topic of choice.

Students are required to work on any feedback from their committee in order to progress to the final CCP Panel Presentation. They are required to submit all materials related to this presentation on ITU's educational management system, EMS.

### **BUS 820 THEORETICAL FRAMEWORKS IN STRATEGY RESEARCH (3)**

Prerequisites: None

A vital goal for all doctoral students is to further business research, and practice, either through creation of new thoughts, and/or through challenging existing theories. This course will enable students to demonstrate a thoughtful consideration of the theoretical constructs that underpin their unique areas of doctoral research. Students integrate learning from the core courses in this program to learn about research logic, the differences between theoretical and empirical paradigms, and types of research methodologies, sampling methods, and data collection. In addition, scholarly research, and specific doctoral writing techniques for publication will be introduced to prepare students for success in their chosen doctoral capstone.

### **BUS 821 RESEARCH DESIGN (3)**

Prerequisites: DBUS 820

This course facilitates students' creation of their doctoral research. Framing the research question, Development and testing of hypotheses, research strategy, Pros and Cons of using certain research designs, Measurement of constructs, Publication, and Empirical research will be the key tenets of this course. The ethical implications of choosing certain research designs will also be explored.

### **BUS 822 CCP FINAL PANEL PRESENTATION (0)**

Prerequisites: DBUS 813

This is the final presentation in a series of three CCP Panel Presentations. At this stage, students will have already

completed most of their doctoral coursework, and based on their research thus far, they will also be ready to present their final comprehensive candidacy portfolio (CCP).

As previously noted in DBUS 711, and DBUS 813, the main focus of the CCP courses is to build the students' portfolio based mainly on their work experience and its alignment with their chosen CE. Students must therefore, be prepared to present to the committee about their work experiences, intended topic of research, and their position on their chosen topic, their intended doctoral capstone, the literature review, and research done on their intended topic till date.

Students are required to submit all materials related to this presentation on ITU's educational management system, , EMS. Upon successful completion of this final presentation, students will progress towards completing their doctoral capstone.

## **BUS 901 DOCTORAL CAPSTONE RESEARCH**

**(9)\***

Prerequisites: DBUS 822 and completion of all course work

This doctoral capstone research is a traditional dissertation. Students work closely with their advisor, conduct their research, and develop their dissertation, achieving the highest levels of scholarship. The dissertation must include original research that is focused either on expanding the methodological scope of the content area, developing new theories, or confirming theoretic models. Research methods that may be employed include field experiments, surveys, and case studies.

\* This doctoral capstone course consists of three (3) sections. The course requires a successful presentation of the doctoral capstone proposal, and a successful defense of the final doctoral capstone.

## **BUS 902 DOCTORAL CAPSTONE PROJECT (9)\***

Prerequisites: DBUS 822 and completion of all course work

Through this doctoral capstone, students will perform specific doctoral research aimed at developing innovative and strategic solutions to organizational problems in the real world. The final capstone project report is equal to a traditional dissertation in terms of academic rigor. Students are encouraged to work with an academic advisor with strong industry experience or an industry expert (mentor) to develop a real life topic identified within a particular organizational context. This capstone course may be developed from students' real work. In addition to a final capstone project report, deliverables could include a product, an application, and others.

\* This doctoral capstone course consists of three (3) sections. The course requires a successful presentation of the doctoral capstone proposal, and a successful defense of the final doctoral capstone.

## **BUS 903 DOCTORAL CAPSTONE PUBLISHABLE PAPERS (9)\***

Prerequisites: DBUS 822 and completion of all coursework

This capstone requires doctoral students to write three (3) separate publishable papers, on a single or related theme. Students are encouraged to publish these papers in a peer reviewed or refereed Journal. The doctoral capstone consisting of three (3) publishable papers is also equal to a traditional doctoral dissertation in terms

of academic rigor, quality of research, and presentation of key information.

\* Each doctoral capstone course consists of three (3) sections. The course requires a successful presentation of the doctoral capstone proposal, and a successful defense of the final doctoral capstone.

## **ECN 500 PRINCIPLES OF ECONOMICS (3)**

Prerequisites: None

The course provides a deeper understanding of principles of economics as it relates to economic problems and how they can be leveraged to meet economic needs. It discusses commonly used guidelines for time spent versus the economic value generated. Key topics such as basic economics problems, principles of resource allocation, theory of production, demand and supply, price determination and elasticity, customer behavior, monopoly, competition, etc. are covered.

## **ECN 501 PRINCIPLES OF MICROECONOMICS (3)**

Prerequisites: None

This course emphasizes microeconomic concepts and analysis, theories of the business organizations, and individual behavior, price competition, price monopoly, economic value, and supply and demand analysis. Additional topics such microeconomic applications, economic policy, currency, and consumer responses are covered.

## **ECN 502 PRINCIPLES OF ECONOMIC UNCERTAINTY AND COMPLEXITY (3)**

Prerequisites: None

The course discusses uncertain and complex scenarios and how principles of economics can be applied to find a feasible solution. Changing conditions such as inflation, monetary system, national budget, international trade and finance, business fluctuations, unemployment, etc. are covered.

## **ECN 503 FUNDAMENTALS OF ECONOMIC DEVELOPMENT (3)**

Prerequisites: None

This course focuses on economies and different societies and cultures with an emphasis on their complexity and heterogeneity. Using the economic principles, students will learn reasons for continued differences in poverty. The course covers developing economic models that can incorporate and explain and predict outcomes to develop economy. Publicly available data sets will be used in developing economic models and analysis.

## **ECN 504 ECONOMICS OF BUSINESS (3)**

Prerequisites: None

This course covers business economics encompassing topics such as the concept of scarcity, product factors, distribution, and consumption. Economic theory and quantitative methods are discussed to understand various factors affecting businesses and its economy.

## **ECN 505 ECONOMICS OF STRATEGY AND MANAGERIAL DECISION MAKING (3)**

Prerequisites: None

This course explains factors that influence a firm's business, uses of cost of capital, forecast demand models,

estimate price elasticity, defining optimal price, and market structures. Application of game theory to understand business situations, cost-benefit analysis, government policy, etc. are covered.

### **ECN 506 FINANCIAL CRISIS – HISTORY (3)**

Prerequisites: None

The course discusses history of financial crisis incidents and learning from each of them. Emphasis will be placed in understanding reasons behind recurring historical patterns of financial bursts. The students will learn the historical evidence of financial crisis that will enable students to gain understanding of the globalized economy, facts, theorems, economic meltdown, and influence of government policies.

### **ECN 507 BEHAVIORAL ECONOMICS (3)**

Prerequisites: None

This course emphasizes on economic theory and analysis while providing an analysis and economic mathematical methods, research methods in economics and human behavior. Topics relevant to behavioral economics including micro and macroeconomics, consumer behavior, financial market analysis, international markets and trade policies, and influence of political policies will be covered.

### **ECN 508 ECONOMIC OF FINANCIAL MARKETS (3)**

Prerequisites: None

This course discusses role of financial markets, prices, the economic value, and impact of financial market imperfections. An in-depth analysis of the economic and financial models and an ability to demonstrate market viable results and alternatives are discussed. Key topics such as the present value model, volatility, interest rates, foreign exchange markets, consumption, market structures are covered.

### **ECN 509 ECONOMIC OF EMERGING MARKETS (3)**

Prerequisites: None

This course combines aspects of economic analysis and business economics to study issues related to emerging markets. Topics such as economic theory, data analysis, and market analysis are discussed to gain insights into emerging economies. Role of emerging markets in the global economy, along with macroeconomics and business strategies in emerging economies, impact of governance policies on economic development, factors affecting emerging markets and economies will be discussed.

### **ECN 510 FUNDAMENTALS OF THE REAL WORLD ECONOMY (3)**

Prerequisites: None

This course covers topics relevant to real world economics and explore the role of psychology, sociology, and political science and other multidisciplinary approaches to develop economic theory and policies. Many real time perspectives on the psychological foundations of economic activity, behavioral economics and behavioral finance are covered as a basis to understand emerging economics. Main emphasis will be placed on real-world applications of economics with a goal to find alternative solutions.

## **ERP (ENTERPRISE RESOURCE PLANNING)**

### **ERP 509 INTRODUCTION TO ERP SYSTEMS**

#### **USING SAP (3)**

ITU/SAP University Alliance

Prerequisites: None

Introduction to ERP using SAP is prerequisite course for students who want to pursue other ERP courses. This course is designed for students to get a basic understanding of all the functional departments that exist in a business scenario. It gives an idea about how these functional departments work and how they are integrated in ERP systems to avoid duplication of work, and to provide efficiency and effective use of resources. This course is a general overview of the SAP ERP System concepts and tools. It introduces SAP as one of the ERP systems and explains how the fundamental business processes interact in SAP ERP in the functional areas of Sales and Distribution, Materials Management, Production Planning, Financial Accounting, Controlling, Human Capital Management, Project Systems, and Enterprise Asset Management. The course is presented in lecture format with open discussion and hands-on problem solving exercises.

### **ERP 510 ABAP - ADVANCED BUSINESS APPLICATION PROGRAMMING (3)**

ITU/SAP University Alliance

Prerequisites: None

ABAP is the language for programming SAP's Web Application Server, part of SAP's NetWeaver platform for building business applications. This course introduces the ABAP language environment, including the syntax checking, code generation and runtime system, and various features of ABAP Programming. Though this course starts from basics it's useful if students have basic programming knowledge with object oriented concepts and knowledge of relational database design. Students will get hands-on experience with scenarios, which will be discussed and worked on, in class on SAP system. Students will be given programming tasks to work on.

### **ERP 511 ENTERPRISE PORTAL TECHNOLOGY USING NETWEAVER (3)**

ITU/SAP University Alliance

Prerequisites: None

SAP NetWeaver is SAP's integrated technology platform and is the technical foundation for all SAP applications since the SAP Business Suite. SAP NetWeaver is marketed as a service-oriented application and integration platform. SAP NetWeaver provides the development and runtime environment for SAP applications and can be used for custom development and integration with other applications and systems.

### **ERP 512 ENTERPRISE PROCUREMENT PROCESSES (MM) (3)**

ITU/SAP University Alliance

Prerequisites: None

Today's enterprises face increasingly complex procurement processes. This course introduces the external procurement process. During the course, the students go through the entire procurement process with its typical steps - purchase requisition, purchase order, goods receipt, and entry of incoming invoice and payment. The students get to work on SAP course will quickly build through each of these concepts using Fitter Snacker case study or Quazi case study and configuration so that by the final day of class, each student will have hands on configuration experience in procurement processes. In

doing so, the students will focus on different aspects and become acquainted with additional functions.

### **ERP 513 SALES ORDER MANAGEMENT WITH ERP (3)**

ITU/SAP University Alliance

Prerequisites: None

This course introduces the sales order management process with the SAP ERP Central Component. During the course, the students learn the entire sales order process starting from a sales inquiry, entering sales orders, creating outbound deliveries, posting goods issue and invoicing the customer and entering the incoming payment. The course will quickly build through each of these concepts and configuration using the Quazi Computer case study and by the final day of class, each student will have fully walked through the Sales and Distribution process using the SAP system. In doing so, the students will focus on different aspects and become acquainted with additional functions in the sales order management process chain.

## **FIN (FINANCE)**

### **FIN 515 MANAGERIAL FINANCE (3)**

Prerequisites: None

The course teaches the students financial concepts and tools necessary for effective business planning. Topics include formation of interest rates, income taxes, working capital management, cost of capital, financial forecasting, external sources of capital, company valuation, and bankruptcy.

### **FIN 516 ENTREPRENEURIAL FINANCE (3)**

Prerequisites: None

This course approaches the topic of entrepreneurial finance from a startup or early stage business owner's perspective. The course assumes that the student has a modest or no background in finance, accounting, or economics. The classroom discussions together with the textbook are used to develop a foundation for understanding the practice of finance and financial decision-making under company startup conditions. We work together to create a basic understanding of the financial concepts, statements, and tools, as well as financial planning required to start a business or advance an early stage company. The financial plan explores the uses of financial analytics and integrating financial proforma statements with the business plan. The course learning process includes examining the roles of capital and its sources for startups and early stage companies; reviewing financing alternatives such as debt, equity, and credit as sources of working capital for entrepreneurs; and exploring other innovative techniques for financing a new venture. Implicit in these areas are the topics of mastering the concepts of revenue generation, operational costs, profitability, and cash flow. Students will explore a variety of financial analytical concepts such as ratios, time value of money, and capital budgeting to assist us with our entrepreneurial financial planning and decision making. The course concludes with a discussion on structuring financial liquidity events for investors.

### **FIN 517 FINANCIAL INSTITUTIONS (3)**

Prerequisites: None

In the Fall of 2007, the US and other international financial markets experienced a major crash proceeded by record stock market highs. In this course students examine the products, markets policies, investment products, and financial institutions that precipitated this global event. Students will draw on a combination of finance research journals, Internet articles, as well as other international finance textbooks to further supplement our understanding of the Finance Markets and Institutions. Our course utilizes several contemporary journal publications to build a rich discussion on the topics of financial markets and institutions, as well as financial objectives and strategies impact on international business expansion.

### **FIN 518 FINANCIAL AND SOCIALLY RESPONSIBLE INVESTING (3)**

Prerequisites: None

Socially responsible investing is a course that examines one of the fastest growing areas in the global financial markets. The global financial crisis of the 2000s have shown that socially responsible investments (SRIs) have a place in building financially sound investment portfolios while doing social good. The course utilizes financial and global macroeconomics to support developing the basic investment mechanics and strategies. The initial objective of this course is to develop students' qualitative and quantitative skills for understanding the basic principles of socially responsible investing.

### **FIN 519 CORPORATE VALUATION (3)**

Prerequisites: None

The focus of this class is on making investment decisions in real (as opposed to financial) assets. It will acquaint the student with the widely used ideas that have revolutionized the practice of valuation during the past few decades. By the end of the course, students should be comfortable in answering the question: What is a real asset - a new product, a new project, a division, or a company - worth?

### **FIN 520 INVESTMENT MANAGEMENT (3)**

Prerequisites: None

This course offers the basics of investment management. Quoted and private equity investments and entrepreneurial finance are the focus of the topics. This course introduces market and portfolio perspectives, starting with the discounted cash flow methods to the concept of term structure in the valuation of risk-free cash flows, including forward rates and valuing risky or uncertain cash flows. The course prepares students to identify various investment products. Both real world and theoretical views are discussed.

### **FIN 521 INTERNATIONAL FINANCIAL MANAGEMENT (3)**

Prerequisites: None

This course provides students with the framework for making corporate financial decisions in an international environment. Topic include: measurement of currency exposure and of currency risk. In addition, topics about the decision to undertake a global financing program, exchange and capital market, capital budgeting analysis for foreign direct investment, and the value of target firms

for cross-border acquisitions are discussed. The course will examine different aspects of the foreign exchange market, the role of governments, and the central banks. The main focus is on the markets for spot exchange, currency forwards, options, swaps, international bonds, and international equities. Multinational financial transactions create unique challenges due to the market complexity, the exchange rate, and the political risks.

### **FIN 522 BEHAVIORAL FINANCE (3)**

Prerequisites: None

The theories of finance and investment have focused on financial tools to characterize and quantify wealth creation and its associated risks. These tools have assisted investors to compute asset price and make investment decisions. In this course, we study the psychological influences of investor behaviors. Students examine the behavioral biases that people have when making purchasing, budgeting, or investing decisions. The class will also discuss Dual Motive Theory in terms of Ego/Empathy and greed/positive financial impact to understand how brain functions can impact financial behavior and relationships.

### **FIN 523 MACROECONOMIC THEORY (3)**

Prerequisites: None

This course discusses basic principles and theories of macroeconomics, and components and measurement of production, income, and other key economic variables of the U.S. domestic economy. The course focuses on the analysis of the interrelationship among leading, lagging, and coincident indicators; key economic variables; and fiscal and monetary policy within the framework of the business cycle. Students will practice using publicly available economic data and conduct analyses of the state of the economy, forming an educated guess about its future direction, and applying that knowledge for decision-making in the context of their particular business activity.

### **FIN 525 ECONOMETRICS (3)**

Prerequisites: None

This course covers concepts of econometrics and their practical applications for business and economics. From single and multivariable models under classical assumptions, the course moves on to study models that exhibit the problems of multicollinearity, heteroscedasticity, and autocorrelation. In addition, specification errors, and identification problems in single equations and in simultaneous equation systems are also studied. Students will learn how to use an econometric software package to run models to simulate and solve practical problems in the field of business and economics.

### **FIN 526 INTERNATIONAL ECONOMICS (3)**

Prerequisites: None

This course examines basic principles and theories of international economics (the standard trade model and the Heckscher-Ohlin theory); international trade policies (tariff and non-tariff barriers); balance of payments, foreign exchange markets, and exchange rate determination; and the relationship between exchange rates, current accounts, and the economy as a whole, including fiscal and monetary policies in an open-economy.

### **FIN 534 FINANCIAL AND ECONOMIC ANALYSIS (3)**

Prerequisites: None

This course discusses criteria and methods to evaluate the net benefits of investments projects and, once selected for implementation, the best way for a firm to fund and implement such projects, in a way that cash flow is optimized. The course explores the following topics: financial ratios and financial statements, measures of investment risks, models of asset returns, valuation of derivative securities, valuation techniques using time value of money tools, analysis of how capital inflows affect emerging market economies, evaluating and selecting investment in long-term assets, determination of financial mix (capital structure) to fund long-term investments, short-term financial planning, working capital management, short-term cash flow planning and forecast, and microeconomic and macroeconomic topics relevant to financial management.

### **FIN 604 SECURITIES ANALYSIS (3)**

Prerequisites: FIN 515, or basic knowledge of finance

Security Analysis is about understanding the characteristics of and influences on financial securities, as well as making investment decisions. This course draws on the work of Berk & DeMarzo (2007), Copeland, Shastri, & Weston (2010), Fabozzi, and Modigliani & Jones (2010) to explain, validate, and build on the early theoretical securities pricing work of Bronzin (1907) and Bachelier (1914). This foundation is augmented by the investment theories of Working (1934), Kendall (1953), Osborne (1959, 1962), Markowitz (1952), Fisher (1907, 1930), Keynes (1920) et al. in asset pricing and valuation; as they have played important roles in the development of modern theories in securities analysis. The class knowledge base is brought up to date with the debates regarding CAPM, APT, and other asset pricing and analytical models.

### **FIN 605 FINANCIAL DERIVATIVES AND RISK MANAGEMENT (3)**

Prerequisites: FIN 515, or basic knowledge of finance

Derivatives provide users an opportunity to mitigate risk, as well as increase financial returns. They also have a dark side where they can be prone to misuse and abuse. Derivative theory and risk management offers us a framework, together with a set of analytical techniques, for characterizing risks and determining the valuation of an asset, investment, and opportunity. The objective of this course is to become familiar with the basic building blocks of derivatives: forward contracts, future contracts, options, and swaps. Students build on this foundation with the creation of derivative strategies and risk management techniques. Students develop asset including option pricing models from a variety of financial theorists.

### **FIN 606 CORPORATE FINANCE (3)**

Prerequisites: FIN 515, or basic knowledge of finance

Corporate Finance brings together the academic rigor and practitioner perspectives on making business and economic decisions. The course will draw on a combination of finance research journals, Internet articles, and other finance publications to supplement the understanding of the discipline. The course utilizes several contemporary publications to build a rich discussion on the topics of finance, as well as how to develop financial objectives. Class time will provide the opportunity for collaborative discussions, exchanges of the impact of Finance on business concepts and globalization oppor-

tunities, and the interactive use of finance applications, models, and analytical tools.

### **FIN 607 MERGERS AND ACQUISITIONS (3)**

Prerequisites: FIN 515, or basic knowledge of finance M&A are a powerful tool for building competitive advantage. In a global marketplace it offers strategic advantages for business expansion relative to corporate assets, products, technology & IP, as well as marketing distribution channels among other financial benefits. In this course we develop skills for the obligatory financial analysis of M&As. Students examine a full range of business dynamics and strategy considerations regarding M&As and reach beyond analysis to the synthesis of M&A issues to develop a framework for successful M&A planning, implementation, and post M&A activities.

### **HCM HEALTHCARE MANAGEMENT**

#### **HCM 509 - SCIENTIFIC WRITING AND RESEARCH FOR HEALTHCARE (3)**

Prerequisites: None

Through this course, students will become aware of medical language and standard medical terms used in medical journals, grant applications and others. The course enables students to be on par with other medical professionals through their written communication. Topics discussed in this course are healthcare related documentation, access to healthcare journals and databases for research purposes.

#### **HCM 510 A REGULATORY OVERVIEW & COMPLIANCE (3)**

Prerequisites: Any Biology background: Academic or Professional

This course will offer a summary of the drug development procedure. The emphasis will be on drug development science, regulation, and business from the U.S. standpoint. Most the lectures will be a concise educational outline of today's subject, followed by dialogue of a main scientific publication that highlights the significant theories covered.

#### **HCM 511 CONCEPTS OF HEALTHCARE MANAGEMENT (3)**

Prerequisites: None

This course provides a dynamic introduction to the health sector. In addition it provides an overview of concepts and issues related to healthcare leadership. While the emphasis will be on the American system, a global context will be developed. The basic elements of insurance and payment, service delivery, and life sciences products will be described, and put in the context of the unique economic structure of the sector. The intense challenges of the sector will be explored, as well as both the ethical issues presented and the opportunities that emerge. Through the examination of management topics and healthcare situations, the student will explore the skills and knowledge needed to be successful in a diverse healthcare environment. Topics include organizational design as it relates to the uniqueness of healthcare organizations, managing professionals, and diversity in the workplace. Public policy and technological and practice development as drivers of change will be also addressed.

### **HCM 513 INNOVATING BIOMEDICAL TECHNOLOGY (3)**

Prerequisites: None

This course is recommended for students who are entrepreneurially inclined and would like to develop products and services for biomedical application. It is highly recommended for students with EE or CE majors. They will learn the medical device/application market trends and regulations for product development. The course is designed to provide students with entrepreneurial spirit to get hands-on experience in developing knowledge, kindling innovative thinking and designing products in the bioscience/biomedical arena. Working in groups or teams, students will learn to research market trends, gap analysis and market needs to develop a concept or design a product. They will also learn to research Intellectual Property and patent databases to further develop their concept and avoid IP infringement pitfalls that are bound to arise.

### **HCM 515 HEALTH INFORMATION TECHNOLOGY (3)**

Prerequisites: None

In this course, students will experience a huge amalgamation of information drawn from geography, biology, sociology and economics. This information requires acquiring skills in these discipline and to have certain ethical and moral obligations to put this knowledge to use to derive something tangible for future generations. Biological management goes beyond the formal education in physics, chemistry or biology to understand the very essence of what it means to be inhabitants of the planet. The basic objective of this course is to create a new environmental awareness.

### **HCM 519 HEALTHCARE ETHICS (3)**

Prerequisites: None

This course invites students to explore issues in medical ethics from a personal and professional career perspective. Materials will include case studies of actual situations encountered by healthcare administrators and providers in the United States. Emphasis will be on learning useful approaches and practical principles for decision-making. This course provides an overview of legal doctrine and critically assessing public policy issues. Duties assigned as per healthcare law such as the duty to treat, informed consent, and malpractice liability, and selected issues in bioethics such as the right to die, physician-assisted suicide, and organ transplantation are dealt in detail. Importance of financing and delivery issues such as insurance coverage and care towards patient are studied.

### **HCM 520 HEALTHCARE LEADERSHIP, PATIENT SAFETY AND QUALITY IMPROVEMENT (3)**

Prerequisites: None

This course is designed to address patient safety and quality improvement challenges in providing quality healthcare. Drawing from actual case studies the course explores areas where patient safety is liable to be compromised and find solutions for improvements. With a complex and diverse background of patients and healthcare providers, communication and understanding culture issues is of paramount importance. The course will explore the need for effective communication and tools to meet this need. The course will follow various case stud-

ies in patient's safety as a way to understand and analyze the underlying problems, possible flaws in the systems, designing and improving quality systems to deliver the highest patient safety possible. Case studies from various countries will be part of the course so the student can understand the international implication of quality systems.

### **HCM 525 PRINCIPLES OF MANAGED CARE (3)**

Prerequisites: None

This course invites you to learn about the principles of managed healthcare systems in the United States. Topics covered include: health insurance, network contracting, provider payment, management of utilization and quality, and laws and regulations. Spot quizzes will identify learning transfer and possible gaps. Both interim midterms and a comprehensive exam will ensure overall paced learning. Special attention will be paid to the details of and latest news about the federal Patient Protection and Affordable Care Act of March 2010.

### **HCM 529 MENTAL HEALTH AND WELLBEING (3)**

Prerequisites: None

This course invites students to explore issues in mental health and wellbeing from a personal and professional career perspective. Topics will include materials on support organizations (both local and online), self-care activities, and current important issues. Emphasis will be on learning useful approaches.

### **HCM 531 COMPLEMENTARY AND ALTERNATIVE MEDICINE (3)**

Prerequisites: None

Modern medicine is evidence-based, scientifically rationalized, and follows a reductionist approach while many of the alternative medicines are not. However, there is an increasing body of scientific work related to the systematic study of alternative medicine in disease states. Students will investigate the research findings to understand, rationalize, and develop a higher order of thinking to how to benefit from the adoption of these practices and integrate them with modern medicine. Healthcare cost and health management can be more effective with the integration of the old with the new, forging new paths for management of disease and developing new paradigms for a healthy life.

### **HCM 534 FINANCIAL MANAGEMENT FOR HEALTHCARE ORGANIZATION (3)**

Prerequisites: Basic Knowledge of Financial and Managerial Accounting or equivalent

In this course, students will learn the basics of budgeting and accounting for health, and not-for-profit organizations. Readings, real-world case studies, and lectures students will know how to use financial information in organizational development, application, control, recording, and analysis.

In addition, the course emphases are on managerial accounting. Topics include time value of money, capital budgeting, cash budgets, operating budgets, break-even analysis, indirect cost allocation, variance analysis, and long-term financing.

The course also emphasizes on financial accounting. Topics include the preparation and analysis of financial state-

ments (balance sheet, income statement, and cash flow statement), government accounting, and ethics in financial management.

Topics explain financial management of working capital and investment decision models, long term capital structure and mergers and acquisitions of healthcare organizations. Course's contents will include cases about a range of healthcare organizations (hospitals, managed care, health centers, physician, home health organizations, etc.)

### **HCM 535 DATA ANALYTICS APPLICATIONS IN HEALTHCARE (3)**

Prerequisites: None

This course focuses on application of data science and analytics techniques to concepts and problems in healthcare. Data analytics in general and in the context of healthcare in particular involves many steps including data generation, data extraction, data analysis, visualization and reporting. An overview of these data analytics stages will be provided as they apply to healthcare industry. A review of basic predictive analytics concepts such as statistical learning using regression techniques, classifiers and decision trees will be given. Application of these techniques to healthcare issues such as patient monitoring, preventive diagnosis, and personalization of treatment for patients will be discussed. The students will learn and analyze the impact of data analytics in planning, process efficiency, and resource management in healthcare industry.

### **HCM 536 HIGH RELIABILITY HEALTH CARE ORGANIZATIONS (3)**

Prerequisites: None

This course focuses on the art and science of leading for highly reliable performance in the modern healthcare industry. Students will learn how individuals can engage in efforts within and across organizations to ensure high reliability by studying case studies related to decision-making and team organization in various healthcare settings at the face of diversity. The course pays special attention to the cognitive and effective dimensions of leading in today's uncertain and dynamic healthcare environments, whether that means motivating a clinical care team, launching a new medical product, ensuring quality and payment coverage across a healthcare system, or coordinating patient access to health services.

### **HCM 537 COMMERCIALIZING MEDICAL DEVICES, DIAGNOSTICS AND BIOMEDICAL INNOVATIONS (3)**

Prerequisites: None

This course provides an overview of design control, methods and best practices governing the medical device industry, digital health application development and biomedical product as well as regulations and the practical application in the scope of marketing and commercialization. Students will learn through a cross-disciplinary approach, how to launch, and market a new device, a health app or a biomedical product including lifecycle management and intellectual property laws in the context of this industry.

### **HCM 538 PREDICTIVE ANALYTICS AND DECISION MODELS IN HEALTHCARE (3)**

Prerequisites: None

This course explains data-driven modeling methods and decision models to familiarize students with the field of predictive analytics application in the healthcare industry. Prior course work in business analytics and data visualization will add to this course, which builds on assessing data within the healthcare industry context, understanding data trends and risk assessment. Through this course, students will learn how to build reliable predictive models for developing effective decision models for business strategy and organizational competitive advantage in the healthcare industry. Case studies and problems will be provided in related areas such as launch of a new medical device, payment coverage and better service to healthcare products.

### **HCM 539 HEALTHCARE MARKETING (3)**

Prerequisite: None

Healthcare marketing is the promotion of an organization's products or services to increase its value as well as the management process through which goods and services move from concept to the customer. In today's environment, there are variety of challenges for many healthcare organizations due to complexity of the new technologies, competition, regulatory issues and approval process. This course will prepare you to think strategically about the fundamentals of marketing as they are applied across a broad spectrum of healthcare organizations and the role marketing plays in the strategic management of healthcare organizations. After successful completion of this course, you will be able to identify and address marketing opportunities with a strong foundation of marketing principals to develop a marketing plan for any healthcare organization.

### **HCM 690 HEALTHCARE INNOVATION MANAGEMENT PROJECT (3)**

Prerequisites: MGT 503, MKT 551; Completion of 27 credit hours in the program

This course focuses on using the knowledge obtained throughout the healthcare management core and elective courses in implementing a comprehensive project. The nature of the project will be interdisciplinary and students with different background and skills are encouraged to participate in the project. The project is inspired from real-life scenarios found in the healthcare management industry. The students will form a team that each will tackle different aspect of the project. An example of a project could be a medical device product development project that requires a market survey, business plan development, design specification document, cost and budgeting, manufacturing/implementation plan. The goal of this course is to expose students to real-life product cycle and provide hands-on experience with an industrial project while emphasizing development of soft skills such as teamwork in a classroom setting.

### **HRM (HUMAN RESOURCE MANAGEMENT)** **HRM 528 HUMAN RESOURCE MANAGEMENT (3)**

Prerequisites: None

This course examines the principles of human resource management, including recruiting, hiring, orienting, training, developing, disciplining, and rewarding employees. The course provides a management-oriented exploration of human resource management, structure, functional ap-

plications, and labor management relations. This course is a humanistic and legal analysis of organizations, focusing on the role of human resource management. There will be an examination of managers and leaders within organizations and their responsibility to maximize performance and make decisions based on ethical criteria. The class will also discuss Dual Motive Theory in terms of Ego/Empathy and ethical/unethical behavior to understand how brain functions can impact human behavior and relationships.

### **HRM 529 EMPLOYEE TRAINING AND DEVELOPMENT (3)**

Prerequisites: None

This course reviews training, employee and organizational development techniques that the organizations use to build group and individual skills. Topics include linking identified needs to business objectives, developing an implementation plan, implementing the plan using a variety of modalities, and assessing results. The students will use a hands-on approach to evaluate organizational needs for employee development. The overarching objective of this course teaches students to assess, develop, facilitate, and evaluate a training program. We will also discuss Dual Motive Theory in terms of Ego/Empathy and self/other behavior to understand how brain functions can impact human behavior and relationships.

### **HRM 530 EMPLOYMENT LAW FOR BUSINESS (3)**

Prerequisites: None

This course emphasizes federal employment statutes. Cases are used to illustrate the various federal courts' interpretation. Federal agencies such as Equal Employment Commission and Department of Labor are studied. Topics on the employment law provide a comprehensive analysis of federal and state laws, which affect the human resource function, including equal employment opportunity, wage and overtime payment, and employment agreements. The course focuses on applying employment laws to develop programs that enable organizations to act positively in meeting both company and work force needs, trying to resolve workplace disputes, prevent litigation, and implement personnel policies and practices in conformity with applicable law.

### **HRM 532 MANAGING HUMAN CAPITAL USING SAP HCM (3)**

ITU/SAP University Alliance

Prerequisite: None

As companies pursue competitive advantages, and seek higher productivity, innovation and profitability, it is imperative that they attract, retain and incentivize their biggest assets: people. This course revolves around appropriately managing "human capital" to attain organizational competitive advantage. Emerging issues surrounding human capital management such as recruiting, retaining, motivating, and incentivizing employees will be discussed. In addition, the challenges of building competitive advantage through effective human capital management will also be addressed from a strategic perspective. A multi-faceted approach is adopted, reflecting the complexity of the environment and issues faced.

Rather than prepare students to enter a career in HR, this course is aimed at intending managers and leaders who

must factor in human capital as an invaluable source of competitive advantage. Other topics may include: Talent and workforce planning in a dynamic environment; building a positive human capital reputation for the organization; systems thinking; organizational change and organizational learning; dynamics of organizational culture, assessing human capital investments; linking corporate strategy and human capital management, and leveraging on emerging technologies.

Lastly, hands on case studies and resources will take students through the key topics. Students will also be introduced to the use of the SAP Human Capital Management (HCM) module. This course is a foundation course for HRM 535: Human Resources and Information Technology using SAP. Students will earn some knowledge and credits towards relevant SAP HCM, and SHRM-CP, or SHRM-SCP certifications (depending on their work in the HR fields).

#### **Certification/award eligibility:**

This course can be used towards the following certificate/certification and award schemes:

1. ITU/SAP University Alliance Joint Recognition Award
2. SAP HCM (SAP Human Capital Management) certification (based on completion of exam directly with SAP)
3. SHRM-CP (Society for Human Research Management-Certified Professional), or SHRM-SCP (based on membership with the SHRM and fulfillment of eligibility criteria)

### **HRM 533 STRATEGIC COMPENSATION: ISSUES AND OPPORTUNITIES (3)**

Prerequisites: None

This class addresses the need for strategically focused compensation systems aligned to the business objectives and examines the related factors that impact employee motivation and productivity in a variety of settings and industry sectors. The course will examine and analyze the various components of compensation systems in contemporary organizations in understanding how and why they add and sustain shareholder and/or stakeholder value.

### **HRM 535 HUMAN RESOURCES AND INFORMATION TECHNOLOGY USING SAP HCM (3)**

ITU/SAP University Alliance

Prerequisite: HRM 532, or equivalent

This course takes a detailed view of the strategic role of information technology and its immense impact on the management of human resources or human capital in organizations. Key HR business processes including Talent Management, Workforce Process Management, and Information Reporting and Analytics will be explored in conjunction with their information technology links and Enterprise Resource Planning links. Other topics include web-based human resources and other technological applications used in various functional areas of human resources. Students will gain significant exposure to configuring SAP's Human Capital Management (HCM) suite and SuccessFactors.

Hands on case studies and resources will take students through key concepts. In addition, key elements of configuration in the SAP HCM module will also be introduced. A critical component of this course will be to discuss the

new developments in Web 2.0 technologies and their implications for the HRM function.

On completion of this course, students will be well poised for relevant SAP HCM, and the SHRM-CP or the SHRM-SCP certification (depending on their work in the HR fields).

#### **Certification/award eligibility:**

This course can be used towards the following certificate/certification and award schemes:

1. ITU/SAP University Alliance Joint Recognition Award
2. SAP HCM certification (based on completion of exam directly with SAP)
3. SHRM-CP, or SHRM-SCP (based on membership with the SHRM and fulfillment of eligibility criteria)

### **INB (INTERNATIONAL BUSINESS)**

#### **INB 553 FUNDAMENTALS OF INTERNATIONAL BUSINESS (3)**

Prerequisites: None

This course provides an introduction to globalization and the cultural, economic, political, and legal environments of international business. The course helps students understand international trade, the role of the government in trade, and have an understanding of the international financial system. It will familiarize students with concepts of international strategy, marketing products in the international arena, and international staffing policy.

#### **INB 554 INTERNATIONAL FINANCIAL MARKETS (3)**

Prerequisites: None

This course analyzes the international financial markets. Topics include foreign currency, international money markets, banking, and capital markets. The course helps students understand the basics of international finance, the foreign exchange market, exchange rate determination, and currency derivatives. The foundation of understanding foreign exchange management, the world financial markets and institutions will be covered.

#### **INB 556 GLOBAL STRATEGIC MANAGEMENT (3)**

Prerequisites: None

This course examines the fact of globalization, and how managers in multinational firms struggle with a complex and rapidly changing international economic environment. The course introduces the business skills of understanding and managing strategic issues in international environment. It will also focus the understanding of the need for awareness of a change in organizations' internal and external environments.

#### **INB 558 GLOBAL MARKETING AND STRATEGY (3)**

Prerequisites: None

This course is an introductory survey of global marketing. Students will learn the mechanism of the decision-making process, and challenges of going global. The culture, legal, political, geographic, technological, and economic influences will be examined in the development of a comprehensive global marketing strategy. The student will gain a perspective of the trade operations mechanism

and develop skills that will enhance their participation in a global economy.

## **INT (INTERNSHIP)**

### **INT 593 PART-TIME/FULL-TIME INTERNSHIP**

**(1/3-3)**

Prerequisites: None

This course consists of participation in a full-time or part-time internship experience, related to the student's field of study under the supervision of both an approved internship provider and a faculty advisor. This course provides practical, hands-on training in a relevant industry to enhance classroom learning. A maximum of 10 credit hours earned in INT 593 may be applied toward the Master's Degree graduation requirements.

## **MBN (MASTER OF BUSINESS ADMINISTRATION, CAPSTONE THESIS)**

### **MBN 697 MBA THESIS (3)**

Prerequisites: MGT 503; Completion of 27 credit hours in the program

Students should select a topic and work with an advisor to complete their thesis paper. The thesis concludes the program and should be taken after all other courses. The students will prepare an independent thesis and defend it before a committee composed of a number of faculty designated by the chair of the MBA program.

## **MGT (MANAGEMENT)**

### **MGT 503 ORGANIZATIONAL LEADERSHIP THEORIES (3)**

Prerequisites: None

The course will provide an in-depth examination of organizational leadership. This course will explain the principles, strategies and elements of effective organizational leadership. Leadership theories are examined in the context of contemporary, global and matrix organizational environments. Students will get the essential knowledge and skills to be efficient in these varied organizational contexts. Students will build an understanding of the work of organizations and the leaders' roles at all levels to enhance organizational performance. In addition, the course will discuss human behavior in organizations, the role of leaders as they move from strategic to tactical implementation, and leading organizational change.

### **MGT 560 PRINCIPLES OF MANAGEMENT (3)**

Prerequisites: None

This course features traditional management principles such as planning, managing, leading and controlling. Two textbooks will be utilized during the semester: one for theory & practical tactics of management, and another for self and other-awareness of people principles of management. Students will read and discuss the two texts and engage in classroom activities and business writing. There will be individual and group written essay, and oral presentation assignments. The class will include a review of Dual Motive Theory, understanding how brain functions of ego and empathy can impact behavior and relationships.

### **MGT 561 COACHING – CHANGING LIVES, CHANGING ORGANIZATIONS (3)**

Prerequisites: None

This course is designed to survey the field of coaching from a theoretical, ethical and practical point of view. Students will explore various coaching methodologies and disciplines. The benefits of coaching and how to select a coach for individuals and organizations will be explored. Coaching skills will be taught and practiced, as well as experienced.

### **MGT 564 PRINCIPLES OF PUBLIC RELATIONS**

**(3)**

Prerequisites: None

This course invites students to learn the language of the field of public relations. Also, students will learn to distinguish between the field of public relations and its related fields: marketing, advertising, public affairs, publicity, and propaganda. Students will compile actual research data about a hypothetical public relations campaign. Students will apply basic public relations principles to case studies. For the final exam, students will deliver effective public relations presentations. Students must come to class with their computers. Students should submit their resumes to the ITU EMS (ems.ITU.edu) before the first class.

### **MGT 566 PRODUCTION AND OPERATIONS MANAGEMENT (3)**

Prerequisites: None

This course will help students to understand theories, problems and methods applicable to the operations of various business organizations. The focus is on decision making in operational areas such as: facility conditions and use, control and manage resource inputs and outputs, types of transformation procedures, and performance evaluations. This course is relevant to people interested in designing and managing production and business processes, and those who manage interfaces between operations and the other business functions. The body of knowledge encompassed in this course will provide the basis for linking corporate strategy to its production and operations management.

### **MGT 567 QUALITY CONTROL MANAGEMENT**

**(3)**

Prerequisites: None

This course focuses on the understanding of effective quality management. It provides the basic quality concepts and the benefits of a quality approach for an organization. It addresses teamwork by explaining the various team types, the roles and responsibilities of their members and the team-building dynamics. The basic quality and quality management tools are described in the context of problem solving and data analysis for continuous quality improvement. The course discusses various statistical concepts and tools, and how they are applied for process monitoring, control, and improvement. It also analyzes the key elements of customer and supplier relationship and their impact on quality for the organization. The course follows the Body of Knowledge (BOK) for the Quality Process Analyst certification of the American Society for Quality (ASQ) and prepares for the certification examination.

### **MGT 568 IMPACT OF INTELLECTUAL PROPERTY IN A GLOBAL ECONOMY (3)**

Prerequisites: None This course provides an overview of

intellectual property law, including trade secrets, patents, trademarks, and copyright. Key objectives are to help students develop an appreciation for the importance of intellectual property as a key economic driver in the modern global economy and to assist them in developing competence in IP management, whether they are technology or business professionals.

### **MGT 569 STRATEGIC OPERATIONS MANAGEMENT (3)**

Prerequisites: None

This course provides an overview of Strategic Operations Management with emphasis on the four core themes of operations strategy, a vital topic for any company's objectives: strategy, innovation, services, and supply. We will cover the intrinsic and extrinsic factors within an organization's operations, including the input of: Capital, Technology, Energy, and Know-how; and the output of the final product/service for the customer. It will also cover the big picture of Strategic Operations including; supply management, innovation, sustainability, and human resources. Additionally, this course will cover managing strategic operations within organizations including; managing the transformation process, managing quality, managing inventory, capacity and scheduling management, and managing service operations.

### **MGT 571 CRITICAL THINKING STRATEGIES IN DECISION MAKING (3)**

Prerequisites: None

This course provides students opportunities for analysis, synthesis, prescription, and application of critical thinking and decision making within the organization. Emphasis is placed on preparing managers who can deal clearly, rationally, and creatively with a diverse workforce and dynamic workplace. This course equips students with concrete skills in critical thinking and decision making that will allow them to identify and solve organizational problems, as well as provide strategic direction. This course will also discuss Dual Motive Theory in terms of Ego/Empathy and ethical/unethical behavior to understand how brain functions can impact human behavior and relationships.

### **MGT 572 HIGH-TECHNOLOGY ENTREPRENEURSHIP (3)**

Prerequisites: None

This course is offered for those planning to undertake an entrepreneurial career in starting and building an international company in the high-technology area. A special effort is made to take advantage of ITU's proximity to the entrepreneurial community in Silicon Valley with its fundamental international business thrust. An integrative business plan for a new company in the technology arena is an integral part of the course. Topics covered include: addressing new business opportunities, global trends, high technology, business model design, start ups, venture capital process and tools. This course will cover the basics of building a business plan to meet emerging needs. Concepts and techniques of social entrepreneurship will provide the foundation for learning and communicating.

### **MGT 573 INTERNATIONAL MANAGEMENT (3)**

Prerequisites: None

This course studies the role of managers in global mar-

kets. Topics include the external economic and political environment, international strategic planning, partnerships, global human resource management, managing technology, product and service design, ethics and leadership. The course utilizes innovative techniques and case study analysis from a variety of national, and multinational firms.

### **MGT 575 PROJECT MANAGEMENT (3)**

Prerequisites: None

This course provides an overview of project management history, culture, methodologies, leadership and strategic planning. The course introduces important tools, such as work breakdown structure, scheduling, earned value analysis, and risk management. Case studies from a variety of organizational settings are discussed. The course discusses the 5 processes that must be done for project success: Define, Organize, Execute, Control and Close. The strategic implications of projects will be considered with respect to the organizational vision. This course follows the Project Management Body of Knowledge (PMBOK) of the Project Management Institute (PMI) and prepares for the examinations for the Certified Associate in Project Management (CAPM) or the Project Management Professional (PMP) certifications. The course focuses on the concepts and tools of the different project management elements. It first sets the project management framework and describes the different steps in the project management process. Next, all the key management aspects of a project are addressed: integration, scope, time, cost, quality, human resources, communications, risk, procurement and stakeholder.

### **MGT 576 ORGANIZATIONAL THEORY (3)**

Prerequisites: None

Organizational Behavior is the study of individual behavior and group dynamics in organizational settings. It focuses on timeless topics such as motivation, leadership and teamwork and more contemporary topics such as organizational citizenship behavior and transformational leadership.

Few, if any of the dramatic challenges facing today's organizations can be handled effectively without a good understanding of human behavior as it is presented in organizational settings. One simplistic way of looking at this course is to view the organization from an internal level with the observation and interpretation of its members' behavior at an individual and group level, and then to look at organizations on an external level, as it interacts with the outer environment.

The objectives of this course rest on the assumption that learning involves not only acquiring knowledge, but also developing skills. Thus, the class lectures, discussions, exercises, articles and cases present the opportunity for the student to acquire the concepts, ideas and theories that are important to any study of organizational behavior and to apply this knowledge to practical issues that enhance the explanation of human behavior at work.

We will include a review of Dual Motive Theory, understanding how brain functions of ego and empathy can impact behavior and relationships.

### **MGT 577 PROJECT RISK MANAGEMENT (3)**

Prerequisites: None

After a brief overview of the project management framework and processes, this course explains how risk man-

agement is integrated into the different knowledge areas of a project. The course then addresses the six elements of risk management: risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control. In this context, the course explores the project management techniques and approaches to identify, and analyze the full range of project risks for successful project risk management outcomes. The various concepts and tools are illustrated by examples and case studies. This course will also emphasize the communication requirements that successful project managers use to manage risk and uncertainty.

### **MGT 578 BUSINESS COMMUNICATIONS (3)**

Prerequisites: None

Communication is an essential component in every career and life task. This class is intended to provide background and guidelines on what is good communication in a business setting. Activities will be punctuated by theories, attitudes and behaviors of researchers, educators, or business leaders regarding essential communications and leadership practices. There will be frequent opportunities to interact, write on concepts, and present original contributions through the class community environment. It will include a review of Dual Motive Theory, understanding how brain functions of ego and empathy can impact behavior and relationships.

### **MGT 579 BUSINESS ETHICS (3)**

Prerequisites: None

This course introduces ethical decision-making in business environment. It examines the individual, organizational, and macro level issues. The course does not attempt to determine correct ethical action. In the complex business environment in which managers confront ethical decision-making there is no absolute right or wrong answer in most cases. Since there is no general agreement on the correct ethical business norms, critical thinking and relevant decision making are examined. It will also discuss Dual Motive Theory in terms of Ego/Empathy and ethical/unethical behavior to understand how brain functions can impact human behavior and relationships.

### **MGT 580 BUSINESS LAW (3)**

Prerequisites: None

Business law reviews issues with the legal problems confronting businesses such as court procedures, contracts and property law. Other topics include court systems, litigation, and alternative dispute resolution; constitutional and administrative law; tort law and, product liability; contract law and, agency law; business organizations; and government regulation of businesses including antitrust law, employment law, and securities regulation.

### **MGT 581 MANAGING EMOTIONS, MANAGING SELF AND OTHERS (3)**

Prerequisites: None

This course will describe the aspects of Emotional Intelligence and managing yourself and others, starting with self-awareness, empathy, and regulating emotions for self and others to sustain healthy and authentic relationships. Other aspects include positive and negative emotional contagion, EI's effect on morale, leading and professionalism. It will include a review of Dual Motive Theory, under-

standing how brain functioning of ego and empathy can impact behavior and relationships. Finally, the class will study evaluations of cognitive, emotional and social competencies and scholarly research showing how humans flourish.

### **MGT 582 TEAM AND GROUP DYNAMICS (3)**

Prerequisites: None

Team and Group Dynamics are an essential component in every career and life task. In this course, students will learn and apply the skills required for effective teamwork that applies in many industries. Our activities will be punctuated by theories, attitudes and behaviors of researchers, educators or business leaders regarding essential teams and group dynamics. There will be frequent opportunities to interact, write on concepts, and present original contributions through the class community environment.

We will include a review of Dual Motive Theory, understanding how brain functions of ego and empathy can impact behavior and relationships.

### **MGT 583 GLOBAL ENTREPRENEURSHIP AND INNOVATION (3)**

Prerequisites: none

This course focuses on methods and know-how of effectively managing innovation and entrepreneurship. Throughout the semester the theory and practice of managing innovation in small and large companies will be discussed. Topics such as strategies, business models, risks, fund raising techniques are explained. The course emphasizes learning and practical issues through readings, case analyses, written assignments and in-class discussion. The case studies will include companies from around the world that have been successful in innovating repeatedly and those who were not able to re-invent and hence failed. The assignment will combine both strategy and implementation of innovation and entrepreneurship so students can critically evaluate approaches to managing innovation and entrepreneurship and provide practical help in this context.

### **MGT 584 SUPPLY CHAIN MANAGEMENT (3)**

Prerequisites: None

The business world today is becoming increasingly global and complex. The overall success of an organization relies more and more on the efficiency and effectiveness of its supply chain. Having a superior product means nothing unless it is delivered to customers on time and in perfect condition. With the strategic combination of people, tools, processes and technologies, effective supply chain management can boost customer service, improve bottom line and enable an organization to successfully compete in the global marketplace.

Formerly known as, MGT 584 "Supply Chain Management" August 2015 - July 2016.

### **MGT 593 INTRAPRENEURSHIP - INNOVATION FROM WITHIN (3)**

Prerequisites: None

This course speaks directly to the needs of an organization seeking to create an innovative business opportunity within the existing structure of the organization. The methods from this class are widely used by the most successful innovators in start-ups as well as established

companies. This class will present the differences between entrepreneurship and intrapreneurship. Innovation and creativity are key components of intrapreneurship.

### **MGT 608 BUSINESS STATISTICS (3)**

Prerequisites: Calculus, Algebra II, or equivalent  
With many unfamiliar concepts and complex formulas, business statistics can be confusing and demotivating experience for students that do not have a strong mathematics background. They can have trouble recognizing the importance of studying statistics and making connections between business problems and the statistical tool that can be used to solve them. This seventh edition of Business Statistics: For Contemporary Decision Making has been designed to provide students with better explanations and examples thus providing a smoother path to understanding and the ability to choose the correct techniques to apply for a given problem.

### **MGT 611 LEAN SIX SIGMA (3)**

Prerequisites: Calculus, Algebra II, or equivalent  
Six Sigma is a proven methodology for solving problems in many areas of business, science, and industry. It is essentially a structured approach to the scientific method of problem solving based on the DMAIC acronym (Define, Measure, Analyze, Improve, and Control). The methodology helps in design, development, monitoring, and evaluation of processes, products, or services. The Six Sigma methodology incorporates business process, statistical, quality, and project management principles and practices with a goal of creating a systematic and data-driven decision making environment. Many successful companies utilize the principles of Six Sigma to meet growing customer expectations and to deliver better products and services in today's competitive marketplace. This course covers an overview of the Six Sigma principles, process, and implementation, and provides required information for taking Six Sigma Green Belt or Black Belt certification examination.

### **MGT 612 ADVANCED PROJECT MANAGEMENT**

#### **(3)**

Prerequisites: MGT 575, or equivalent

This course offers a study of the human and the operational sides of project management. The human side includes discussion on negotiating and conflict management, leveraging diversity, and selling project management. The operational side includes scope control techniques, risk management, and organizing for success. The students will learn how to effectively engage the project team, deal with the inevitable conflicts, and use intellectual and cultural diversity to encourage creative problem solving.

### **MGT 690 PITCHING A BUSINESS PLAN TO VENTURE CAPITALISTS (3) – CAPSTONE PROJECT**

Prerequisites: MGT 503, MKT 551; Completion of 27 credit hours in the program  
In today's extremely competitive world of raising money for startup companies, it is absolutely critical to have an effective and well-conceived pitch deck that complements the project's vision and strategy. Only 1 of every 200 business plans submitted to venture capitalists (VCs) gets

funded, so it is vital to present a well thought-out presentation that includes all of the elements that VCs (or any type of potential investor) will be looking for in deciding whether to invest in your company or not. Whether the student is interested in starting their own company someday, wants to work for a startup, or just wants to learn more about venture capital, Silicon Valley and startups in general, this will be a great opportunity to discover how startup companies have successfully raised money.  
All new students are required to take Outbound exam with Peregrine Academic Services. The Outbound exam is required to be taken in the capstone course, either MBN 697 Master Thesis or MGT 690 Pitching a Business Plan to Venture Capitalists. Taking the Outbound exam will have a fee which is currently \$34. The Outbound exam is REQUIRED not OPTIONAL. Information on how to take the exams will be included in the course syllabus. Any new student who does not take the Outbound exam, will not be eligible for graduation. Current students are encouraged to take the exam.

### **MIS (MANAGEMENT INFORMATION SYSTEM)**

#### **MIS 527 TECHNOLOGY AND OPERATIONS**

#### **MANAGEMENT: CREATING VALUE (3)**

Prerequisites: None

The course explains the design, management, and development of technology and operating systems. It explores diverse quantitative problems that occur often in the business environments. It discusses how such problems can be properly solved with a joint business insight and technology tools. Topics such as capacity management, service operations, organized decision making, limited optimization and simulation are included. This course teaches the model of complex business situations and the tools to enhance business performance. This course offers an outline of the field of operations technology. A managerial perception is assumed and highlight is placed on the understanding of how technologies for manufacturing, distribution, and service developments are used for competitive advantage.

### **MIS 537 MANAGEMENT INFORMATION SYSTEMS (3)**

Prerequisites: None

This course explains the concept of managing information systems as a part of a broader socio-technical system and their impacts on people and processes in the business environment. Critical thinking is an important and essential part for the understanding of important issues associated with the management aspects of information systems. The course focuses on how the organization has used and can use its information resources to best serve its needs.

### **MIS 538 BUSINESS DATABASE APPLICATIONS (3)**

Prerequisites: None

This course provides a basic overview of the concepts, principles, skills and techniques of business database systems and of database application system development. The course provides an approach to the design and use of databases for business applications. The study focuses on query languages and application generation. Use of database software applications are a necessity in current business environments.

## **MIS 539 BUSINESS TELECOMMUNICATIONS (3)**

Prerequisites: None

This course offers an overview of communications technology used in many business applications - local area network, wide area network, broadband network, wireless, and voice network. The course helps the students understand the role of internet protocols. In addition, it provides training to analyze network requirements, design, and implement local area networks.

## **MIS 540 INFORMATION RESOURCE MANAGEMENT (3)**

Prerequisites: None

This course explains the concept of viewing information systems resources from a strategic resource standpoint. The course will provide pragmatic tools for implementing the IRM within the organization. Topics will include Information System outsourcing, total cost of ownership, Information System planning and strategic analysis, management of IT human resources, traditional project management theory, and project management techniques. It will include a review of Dual Motive Theory, understanding how brain functions of ego and empathy can impact behavior and relationships.

## **MIS 541 MANAGING GLOBAL INFORMATION SYSTEMS PROJECTS (3)**

Prerequisites: None

This course helps the students learn how to plan and manage global information systems projects by focusing on initiating, planning, executing, controlling and closing projects. Topics such as integration, scope, timing, cost, quality, human resource, technology, communications, risk, and procurement are discussed. The students will learn how to monitor project plans and communicate reports to clients. The course will have a team project that will require students to conduct literature review or survey of current practices in the industry.

## **MIS 542 INFORMATION SYSTEMS INNOVATION (3)**

Prerequisites: None

This course provides the tools and the skills to leverage emerging information technologies in order to create new business opportunities for both new entrepreneurial ventures and traditional firms. The course helps the students to understand, evaluate, and apply difficult topics such as new innovative and entrepreneurial information technologies.

## **MIS 543 HUMAN-COMPUTER INTERACTION (3)**

Prerequisites: None

This course focuses on key factors in Human-Computer interaction. Topics include design elements, test procedures, experimental tools, and human-computer environments contributing to the development of successful user interfaces are discussed. Additionally, research topics will be explored in the areas of design principles, methodologies, implementation, and evaluation of user interfaces.

## **MIS 544 BUSINESS DECISION SUPPORT SYSTEMS (3)**

Prerequisites: None

Focus of this course is to study decision making process in business environment. Managerial role in decision making and steps involved in the process will be discussed. Theoretical modeling of decision making and practical applications will be explored using Microsoft Excel and/or other software packages. Part of the course, decision support models such as break-even analysis, goal seeking, linear programming, decision tree analysis, statistical modeling, etc. will be used in defining decision support systems to address various business scenarios.

## **MIS 545 DATA MINING AND BUSINESS INTELLIGENCE USING SAP (3)**

ITU/SAP University Alliance

Prerequisites: None

This course teaches the students business potential of big data and analytics, data warehousing, how to develop and retain data warehouses, and how to use this data for business benefit and as a source for business intelligence. Business intelligence is the use of logical software devices to study big data about an organization and its competitors in business planning and decision-making. In developing data warehouses, the course will address the inter-relationships among operation, decision support structures, plan and the removal and cleaning process used to create a high quality data warehouse. Data mining theories and the use of data mining devices and techniques for decision-making and for creating business intelligence are discussed. This course uses SAP case studies and products to address Business Intelligence issues in real life in the pursuit of competitive advantages.

## **MIS 546 DATA SCIENCE FOR BUSINESS (3)**

Prerequisites: None

Data Science for Business introduces the fundamental principles of data science, and walks the student through the "data-analytic thinking" necessary for extracting useful knowledge and business value from the data they collect. The course provides examples of real-world business problems so the student will not only learn how to improve communication between business stakeholders and data scientists, but also learn how to intelligently participate in and manage their company's data science projects. This course will help the student discover how to think data-analytically and fully appreciate how data science methods can support business decision-making.

## **MIS 547 SOFTWARE DEVELOPMENT PROCESS MANAGEMENT (3)**

Prerequisites: None

This course helps the students to understand the software development process at both the project and organization levels. In addition, it provides the students with the tools to analyze software cost and schedule transaction issues, and teaches them how to apply the principles and techniques to practical situations. Topics include statistical decision theory, and software risk management.

## **MIS 548 KNOWLEDGE MANAGEMENT (3)**

Prerequisites: None

Knowledge management (KM) is considered a competitive resource in organizations that promotes innovation, improves efficiency and effectiveness, and provides a sustainable competitive advantage in today's global environment. This course acquaints the student with organi-

zational and managerial issues and examines Knowledge Management process and systems for supporting KM. Principles of developing systems for KM are explored. System architectures, tools and techniques, and their use in capturing, storing, locating, evaluating, disseminating, and using information and knowledge will be discussed. Application of these principles and techniques through the use of information/communication technologies is studied in the context of their impact on organization.

## **MKT (MARKETING)**

### **MKT 551 COMPETITIVE MARKETING STRATEGIES (3)**

Prerequisites: Completion of 18 credit hours in the program, (One time exception: Students who will graduate in the Fall 2019, can take the course concurrently)  
This course presents ways of finding new marketing opportunities, and enhancing marketing performance. Competitive marketing strategy describes how firms identify opportunities to create customer value and communicate this value efficiently. The key issue is to understand the drivers of greater customer and creating competitive advantage in the marketplace. The course explains the efficiency of strategic marketing decisions. The course offers strategy development by discussing important analysis of various cases from consumer, supplier, and technological markets; production and service businesses for-profit and non-profit sectors. Students will learn how to build a marketing plan.

### **MKT 582 MARKETING MANAGEMENT (3)**

Prerequisites: None  
This course presents an approach to understand and manage the marketing function. The students will learn how to develop a written marketing plan to determine and integrate elements of a marketing strategy. Topics include market segmentation, positioning and research; product decisions; pricing; channels of distribution; advertising; promotion; new product development; and marketing budgets. The course will introduce the role of marketing in the U.S. economy and the interaction of marketing with specific business functions and with society.

### **MKT 583 ENTREPRENEURIAL MARKETING (3)**

Prerequisites: None  
This course provides entrepreneurs with an understanding of marketing for new and small enterprises. It addresses marketing strategies. The Students will apply marketing concepts, such as creating and nurturing relationships with new customers, suppliers, distributors, employees and investors. This course brings together theory and practice to develop a comprehensive entrepreneurial business marketing plan.

### **MKT 585 INTERNATIONAL MARKETING (3)**

Prerequisites: None  
The course presents to the students the major factors of the international marketing decisions. The student will learn about the forces that influence the global marketing environment. The course introduces students to principles, policies, procedures, ethics, and techniques used in efficient and effective international market. International product, price, promotion, and distribution issues are discussed.

### **MKT 586 MARKETING RESEARCH (3)**

Prerequisites: None

The broad objective of the course is to provide a fundamental understanding of marketing research methods employed by well-managed firms. The course is aimed at the manager who is the ultimate user of the research and thus is responsible for determining the scope and direction of research conducted. In the course, we will cover the types of research design, techniques of data collection and data analysis. Emphasis will be on the interpretation and use of results rather than on the mathematical derivations. The course focuses on helping managers recognize the role of systematic information gathering and analysis in making marketing decisions, and develop an appreciation for the potential contributions and limitations of marketing research data. This course examines the role of marketing research within the overall marketing program and within the company or organization seeking research information. It describes the research process and identifies the most common and potent research methods and techniques while providing an opportunity to learn by applying them to a class field project.

### **MKT 587 COMPARATIVE STUDIES OF MNC, FDI, AND INTERNATIONAL TRADE (3)**

Prerequisites: None

Students will study International business and management environments by covering topics such as the international monetary system, import-export, growing competition and trading relationships in a global community. Case studies are presented relating to ethical issues that arise in international business to develop fundamental knowledge of international research and development, marketing, distribution, finance, and accounting.

### **MKT 588 CONSUMER BEHAVIOR (3)**

Prerequisites: None

This course focuses on how to assess customer behavior and interprets this knowledge into marketing strategies. Topics include customer satisfaction and dissatisfaction, and the role of quality, TQM, and cycle time. In addition, the course introduces concepts such as, motivation, perception, knowledge, attitude, and culture on customer decision-making. The course is designed for students interested in consumer, service, high-tech, or not-for-profit marketing. This course evaluates consumer or customer behavior in the marketplace. This course will help future and current consumer oriented professionals, service oriented performers in the high technology or non-profit sectors. The course will also discuss Dual Motive Theory in terms of Ego/Empathy and ethical/unethical behavior to understand how brain functions can impact human behavior and relationships.

### **MKT 589 E-COMMERCE (3)**

Prerequisites: None

This course provides introduction to e-Commerce and related subjects. The course will cover e-Commerce infrastructure and its related technologies. Various business models used in e-commerce will be discussed in the lecture. The student will have knowledge of e-commerce when s/he finishes this course.

## **MKT 590 MARKETING WITH SOCIAL MEDIA (3)**

Prerequisites: None

In this course, students will gain the knowledge and skills to effectively use social media to market their business. The Social Media Marketing course will teach students the basics of content creation and management for social media including blogs, podcasts, and posts. Students will be introduced to the most popular platforms such as Facebook, Twitter, YouTube, LinkedIn, and Pinterest. Students will learn which platforms are the best fits for their company and metrics for measuring social media marketing success. This course will also address the legalities of social media, search-engine optimization, and crowd sourcing.

## **MKT 591 ADVERTISING STRATEGY (3)**

Prerequisites: None

This course will teach the students the new world of Marketing Communication, and the importance of advertising and e-advertising. Topics include analyzing advertising campaigns, advertisements in a structured way, brand equity through advertising strategy, advertising effectiveness and creativity, and end-to-end advertising strategy campaign.

## **MKT 592 SUPPLIER/SELLER MANAGEMENT (3)**

Prerequisites: None

This course will explain all aspects of outsourcing, including planning, finding the right vendor, and negotiating effectively. Topics include relationship building, creating a culture of cooperation, and skills in dealing with vendors. The course will teach the buying and selling processes that corporations use in business-to-business transactions. The focus of the course is on the concept of selling, improving value, and meeting the needs of clients through effective questioning, analysis, sales planning and presentations. The students will learn the major phases of the sales process, the sales objectives for each phase, the client needs, and the solutions' presentation. It will also discuss Dual Motive Theory in terms of Ego/Empathy and self/other behavior to understand how brain functions can impact human behavior and relationships.

## **MKT 593 MARKETING WITH DIGITAL PERSPECTIVES USING SAP CRM (3)**

*ITU/SAP University Alliance*

Prerequisite: None

Digitization, social media, and the web have redesigned the way organizations interact with their customers, clients, and markets. In pursuing ever declining competitive advantages, the pressures for organizations to reach, convert and retain customers are enormous. This course seeks to empower current and intending marketing professionals with the tools of the digital future to reach target markets using the various modalities available to them, including but not restricted to social media platforms.

Students will use the SAP CRM and/or the SAP Hybris Suite to work through Digital Marketing case studies in the professional environment. Other key topics of interest such as Search Engine Optimization, Social Media Marketing, Online Advertising, Web Analytics, and Marketing Data Visualization will also be covered.

This course is designed to be case study based, practi-

cal, and rooted in real world projects and application. On completion of this course, students will be well poised for relevant SAP CRM, SAP Hybris, American Marketing Association (AMA) Digital Marketing and the HootSuite Academy certifications (depending on their work in the SAP and Marketing fields).

### **Certification/award eligibility:**

This course can be used towards the following certificate/certification and award schemes:

4. ITU/SAP University Alliance Joint Recognition Award
5. SAP CRM and/or SAP Hybris certification (based on completion of exam directly with SAP)
6. American Marketing Association (AMA) Digital Marketing Certification (based on completion of exams with AMA)
7. HootSuite Academy (based on membership with the Academy and fulfillment of eligibility criteria)

## **MKT 613 ADVANCED MARKETING (3)**

Prerequisites: MKT 582, or equivalent

The course will explain the importance of marketing, which include market research, competitor analysis and the consumer analysis. The student will explore the marketing process, and concept. In addition, the course will provide a study of the relationship between the marketing mix, and the changing business environment.

### **IDS (Interdisciplinary Sciences)**

## **IDS 550 ITU NUGGETS (CONSILIENCE “UNITY OF KNOWLEDGE” CONTENT) - (1/3 - 2 CREDIT HOURS)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

## **IDS 551 ITU NUGGETS (CONSILIENCE “UNITY OF KNOWLEDGE” CONTENT) - (1/3 - 2 CREDIT HOURS)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

## **IDS 552 ITU NUGGETS (CONSILIENCE “UNITY**

## **OF KNOWLEDGE" CONTENT) - (1/3 - 2 CREDIT HOURS)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

## **IDS 553 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3 - 2 CREDIT HOURS)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

## **IDS 554 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3 - 2 CREDIT HOURS)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

## **IDS 555 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3 - 2 CREDIT HOURS)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

## **PRE-500 ITU PRESENTS (1/3)**

**Prerequisites:** None

ITU Presents, formerly "Joint Seminar," was created and first taught by ITU's Founder, Professor Shu-Park Chan,

who invited guest speakers, typically Silicon Valley industry leaders, to speak on topics of their personal interest followed by a Q&A session with ITU students. Historically, ITU Presents remained the favorite and reportedly "most useful" class of ITU alumni, as it gave ITU students the ability to listen to the real-life experiences of famous technologists who often shared their early career struggles, strategies, and successes with students.

## **FACULTY**

- Ramesh Konda**, PhD Computer Information, Nova South-eastern University  
Chair, Department of Business Administration and Engineering Management
- Aguilera, Frank**, DBA, Golden Gate University, Public Policy  
Core Faculty and Assistance Chair, Business Administration and Engineering Management

## **CORE FACULTY**

- **Bhat, Nutan**, MBA, International Technological University, ERP/SAP
- **Wiggin, Patty**, MBA, DBA, International Technological University

## **ADJUNCT FACULTY**

- **Al len, Karen Haley, MBA**, University of San Francisco, Human Resources and Organization Development
- **Amistad, Felino Anthony, JD**, California Southern University, Law
- **Arnoldussen, Barbara, DBA**, International Technological University, RN, PHN, San Jose State University, Nursing, Project/Program Management
- **Flores, Jimmie, PhD, PMP, RMP, CAPM, SSBB, SPHR, GPHR, Security+, ITIL**, University of Phoenix, Information Systems and Technology, PhD, Fielding Graduate University, Human and Organizational Development
- **Gopal, Venkatesh, PhD**, Anna University, BioTechnology
- **Halawi, Leila, DBA**, Nova Southeastern University, Information Technology Management
- **Hyatt, Stephen, PhD**, University of Windsor, Windsor, Engineering and Quality
- **Mangina, Prasad V., MS**, Engineering, University Of New Orleans, SAP
- **Rahimian, Esmail, PhD**, California Coast University, Management
- **Rayes, Ammar, PhD**, Washington University, Electrical Engineering

## DEPARTMENT OF COMPUTER SCIENCE

### MISSION

The Department of Computer Science strives to prepare its graduates for successful careers as computer scientists, software engineers, or cyber security experts in all fields of society that experience computerization in any form, in the software industry, or in institutions and businesses that have to maintain high levels of cyber security.

### ONLINE AND DISTANCE LEARNING

In accordance with ITUs vision and intent of furthering Online Instruction and Distance Learning, each offered class is given an online presence in the schedule. Online delivery can be in synchronous or asynchronous mode.

### CURRICULUM FOR THE 3 MASTER PROGRAMS

The Department of Computer Science offers three Masters Programs and one Bachelor Completion Program.

The below described curriculum layout applies to all Masters Programs in this department (MSCS, MSSE, MSICS) and to all students starting in Fall 2020 or later:  
The total number of credit hours required for graduation is 39.

The number of credit hours from required courses is 16. Required courses consist of core courses, ITU presents (Joint seminar), Capstone Project, Nuggets and Internship.  
(Nuggets are short Electives)

### NUGGETS

Nuggets are short elective courses with content from across multiple disciplines and follow the same structure and quality assessment aspects as other ITU courses. They carry between 1/3 credit units (5 lecture hours = 10 lab hours = 15 practicum hours) and 2 credit units. They can start at three times during the term in an online and/or in-class format of delivery. They are a bite-sized projects or courses, manage-

able for a busy schedule.

The total of credit hours from Nuggets must be at least 2. The student can choose the topic of a Nugget at will. No prerequisite is required for any Nugget course.

All ITU Nuggets are listed under the Interdisciplinary Department.

### ELECTIVE COURSES

Electives must be chosen from the list of electives given for each of the 3 master programs (MSCS, MSSE, MSICS) The electives in all 3 programs are mutually exchangeable.

### TRANSFER CREDITS

Up to 9 credit hours from a graduate program of a regionally accredited school can be transferred to count as Electives upon approval by the department.

### INTERNSHIP

1 credit hour of Internship is required. In total up to 8 credit hours from Internship can be taken and count in the program as electives.

### INSTITUTIONAL LEARNING OUTCOMES

1. Problem Solving: Construct, interpret, analyze, and evaluate information and ideas derived from a multitude of sources in order to reach reasoned solutions or alternative strategies to solve problems.
2. Critical Thinking: Analyze facts and information from multiple sources in order to assess the relevance and synthesize that information in order to formulate meaningful arguments and conclusions.
3. Communication: Interact clearly and effectively in written and oral forms with personal and professional constituencies.
4. Team Work: Operate collaboratively and respectfully as members and leaders of diverse teams and organizations.
5. Technical Literacy: Work re-

sponsibly, appropriately and effectively, using technology tools to access, manage, integrate, evaluate, create and communicate information and innovation.

6. Research: Identify and implement systematic methodologies for discovering, understanding, analyzing and interpreting materials, information and behaviors.

7. Responsibility: Practice sound, ethical, and social responsibility in professional and personal endeavors and decision-making.

### **AI CONCENTRATION**

Students in the MSCS, MSSE and MSICS programs have the option of completing a concentration in Artificial Intelligence. For details please see the Department of Electrical and Computer Engineering.

### **MASTER OF SCIENCE IN SOFTWARE ENGINEERING**

Software Engineering (SE) is a well established discipline that comprises requirement analysis, design, construction, testing, as well as the economics, and management issues of the creation and maintenance of software. A Software Engineer has the special knowledge and skills necessary to develop and maintain large, complex software systems. Software Engineering approaches all of these problems in a pragmatic and organized way and is concerned with the theoretical and practical aspects of technology, cost, and social impact of effective and efficient software.

Degree programs in software engineering have many courses in common with computer science. However, when it comes to techniques concerned with the reliability of software and with developing and maintaining software that is correct from the start of its development, the engineering knowledge and experience provided in SE programs go beyond what general CS programs provide. It is considered a necessity by many professionals and educators in the

SE field that students of SE should participate in the development of software to be used in earnest by others.

ITU's curriculum for a Master of Science In Software Engineering (MSSE) is concerned with the technical and management issues of SE, but primary emphasis is placed on the technical aspects of building and modifying high quality software systems. It thus allows the students to prepare for careers in businesses that build and sell computers and/or software, in Internet based companies, electronic business organizations, diverse research and development laboratories, aerospace companies, banks, and insurance companies. The development of this graduate curriculum has taken the recommendations of the Joint Task Force on Computing Curricula of the IEEE Computer Society and the Association for Computing Machinery of August 2004 into consideration.

### **PROGRAM LEARNING OUTCOMES (PLOS)**

Upon completion of the MSSE program, graduates will:

- » PLO #1: Be able to identify and apply current and emerging software engineering technologies required for the creation of reliable, predictable, well-engineered software systems. (Mapped to ILO #1, ILO #2)
- » PLO #2: Be able to utilize multiple programming paradigms, including object-oriented, functional, logic, and emerging programming technologies. (Mapped to ILO #1, ILO #2)
- » PLO #3: Show understanding of SE principles and practices as described in the SWEBOk, and other emerging software development processes. (Mapped to ILO #5, ILO #6)
- » PLO #4: Have sufficient skills in human factors to be able to interact with stakeholders from multiple disciplines on the systems engineering level. (Mapped to ILO #3, ILO #7)
- » PLO #5: Have working skills in SE management including team building, leadership, project planning, selection of

tools and processes appropriate to a project.  
(Mapped to ILO #1, ILO #4)

## CAREER OPPORTUNITIES

Jobs within software engineering include, but are not limited to: Software Development Engineering, Software Applications Engineering – analysis, design, construction, testing, as well as the economics, and management issues of the creation and maintenance of software. A Software Engineer has the special knowledge and skills necessary to develop and maintain large, complex software systems.

## PROGRAM REQUIREMENTS FOR MSSE

In total 39 credit hours must be completed.

### REQUIRED COURSES:

- » 3 Core Courses (9 credit hours)
- » Capstone course - Project or Thesis (3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
  - ITU Presents (1 credit hour)
  - ITU Nuggets (2 credit hours)

### ELECTIVE COURSES

A sufficient number of Elective Courses must be completed to bring the total of credit hours to 39.

A minimum 3.0 cumulative GPA (Grade Point Average) is required for granting of the Master's degree.

### CORE COURSES

- » SWE 500 Software Engineering
- » SWE 600 Advanced Software Engineering
- » SWE 602 Software Requirements Elicitation

### CAPSTONE COURSES

- » SWE 690 Capstone Project
- or
- » SWE 695 Master's Thesis

### INTERNSHIP

- » INT 593 Internship (1 credit hour)

## ITU PRESENTS

- » PRE-500 ITU Presents (1/3)

\*Students must take three ITU Presents courses for a total of 1 credit hour.

## ITU NUGGET COURSES

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » DS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
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## ELECTIVE COURSES:

- » With approval from the Computer Science Department any course from
  - Department of Business Administration
  - Department of Engineering Management
  - Department of Electrical and Computer Engineering
- » Internship: 1-8 credit hours
- » Transfer Credits: Up to 9 credit hours from a graduate program of a regionally accredited school with department

## MASTER OF SCIENCE IN COMPUTER SCIENCE

Computer Science is the science of computation using a programmable computing machine, of developing the programs for the computation, developing algorithms for solving computational problems, of acquiring, storing, managing data and information needed in those computations, and of estimating or predicting the feasibility and time constraints of arriving at solutions.

**Graduate programs in Computer Science (CS) differ from undergraduate programs not so much in the topics they cover but in the depth in which the topics are covered. The student has to master deep knowledge of algorithms, operating systems, compilers, internals of databases, visual and sound recognition, robotics, and - in general - has to acquire sufficiently well-founded theoretical knowledge to contribute to computerization in fields not yet known.**

**The Computer Science Program (MSCS) is concerned with the theoretical as well as the practical issues of CS. The theoretical basis must be mastered because CS has a strong relation to mathematical and algorithmic thinking. An essential portion of a computer scientist's work consists of understanding and researching algorithms, as well as developing new ones.**

**This curriculum prepares the graduates for successful careers in the demanding and ever-growing job market in all fields of society that experience computerization in any form, be it web page design, IT security, software development in medicine, education, business administration, robotics, Internet of Things, and more. A solid knowledge of the computer science principles underlying all computerization and program development, augmented by training in leading edge practical skills will enable graduates to play leadership roles in industry as well as to pursue PhD degrees. The development of this graduate curriculum has taken the recommendations of the Joint Task Force on Computing Curricula of the IEEE Computer Society and the Association for Computing Machinery of August 2004 into consideration.**

#### **PROGRAM LEARNING OUTCOMES (PLOS)**

**Upon completion of this program, graduates will be able to:**

- » PLO #1: Lead and organize Information Technology (IT) implementations at

companies and institutions. (Mapped to ILO #1, ILO #3, ILO #4, ILO #5, ILO #7)

- » PLO #2: Invent and improve algorithms for storing, accessing, processing, and analyzing collected data. (Mapped to ILO #1, ILO #2, ILO #5, ILO #6)
- » PLO #3: Invent real time computation methods for analysis and processing of data in robotics (optical, sound, and other real time data from digital sensors). (Mapped to ILO #1, ILO #2, ILO #5, ILO #6)
- » PLO #4: Create innovative and useful features to modern operating systems (multiprocessor, multiprocessing, distributed). (Mapped to ILO #2, ILO #3, ILO #4, ILO #6)
- » PLO #5: Contribute to research and development of algorithms in all areas that are now and in the future subject to computerization. (Mapped to ILO #1, ILO #2, ILO #3, ILO #4, ILO #5, ILO #6, ILO #7)
- » PLO #6: Clearly explain Computer Science concepts in research, development, and educational institutions. (Mapped to ILO #2, ILO #3, ILO #5, ILO #6)
- » PLO #7: Show proficiency and skills in the most important areas of state of the art computer science. (Mapped to ILO #1, ILO #3, ILO #5)

#### **CAREER OPPORTUNITIES**

Computer scientists often work in organizations that develop new technologies and algorithms. Examples include: pattern recognition and signal processing for self-driving cars, artificial intelligence, and data mining. The development of new algorithms often requires a deep understanding of mathematics including knowledge in certain areas of abstract algebra for developing new encryption technologies or counteracting attempts at breaking them. They often work doing research in computer science, as well as working as information technology consultants in banking, insurance companies, and higher education.

#### **PROGRAM REQUIREMENTS FOR MSCS**

In total 39 credit hours must be completed.

#### **REQUIRED COURSES:**

- » 3 Core Courses (9 credit hours)

- » Capstone course - Project or Thesis  
(3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
  - ITU Presents (1 credit hour)
  - ITU Nuggets (2 credit hours)

## **ELECTIVE COURSES**

A sufficient number of Elective Courses must be completed to bring the total of credit hours to 39.

A minimum 3.0 cumulative GPA (Grade Point Average) is required for granting of the Master's degree.

## **CORE COURSES**

- » CSC 501 Discrete Structures
- » CSC 620 Programming Language Theory
- » CSC 680 Advanced Computer Algorithms

## **CAPSTONE COURSES**

- » SWE 690 Capstone Project
- or
- » SWE 695 Master's Thesis

## **INTERNSHIP**

- » INT 593 Internship (1 credit hour)

## **ITU PRESENTS**

- » PRE-500 ITU Presents (1/3)

\*Students must take three ITU Presents courses for a total of 1 credit hour.

## **ITU NUGGET COURSES**

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
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## **ELECTIVE COURSES:**

- » With approval from the Computer Science Department any course from
  - Department of Business Administration
  - Department of Engineering Management
  - Department of Electrical and Computer Engineering
- » Internship: 1-8 credit hours
- » Transfer Credits: Up to 9 credit hours from a graduate program of a regionally accredited school with department chair's approval.

## **MASTER OF SCIENCE IN INFORMATION AND CYBERSECURITY**

Hardly a day goes by when we don't hear about hacking of bank records or databases, penetration into sensitive government and business information and the damage this causes to our economy and security.

The Information and Cybersecurity (MSICS) program offers a holistic education in a variety of security technologies that goes beyond what the thousands of training courses in cyber security offer in order to combat this development, such as network security, risk and data management, preventative measures, computer ethics, digital signatures, and cryptography. The curriculum gives students the technical knowledge to take on a diverse set of industry-specific challenges.

Once students graduate from MSICS, they will be thoroughly educated cyber security professionals with practical skills and in high demand. They will understand the core problems behind cyber security and will develop solutions from the ground up.

## **PROGRAM LEARNING OUTCOMES (PLOS)**

Upon completion of this program, graduates will:

- » PLO #1: Secure organizations' on-premise and cloud-based computing resources (mapped to ILO #1, ILO #2, ILO#5, ILO#6)
- » PLO #2: Demonstrate in depth knowledge of IS

- techniques to provide leadership for effective solutions to security problems. (Mapped to ILO #1, ILO #3, ILO #4, ILO #7)
- » PLO #3: Have sound knowledge of IS techniques that play a role in organizational processes and decision-making. (Mapped to ILO #2, ILO #4, ILO #5, ILO #7)
  - » PLO #4: Communicate effectively risk management issues and their impacts to a variety of audiences. (Mapped to ILO #1, ILO #3, ILO #5, ILO #6)
  - » PLO #5: Understand the legal and appreciate the ethical importance of ICS for individuals as well as organizations. (Mapped to ILO #3, ILO #6, ILO #7)
  - » PLO #6: Business enabler in organizations such as finance, insurance, healthcare, e-commerce, and mail services. (Mapped to ILO #1, ILO #2, ILO #4, ILO #7)
  - » PLO #7: Work as security expert in federal agencies for whom cyber security is of highest importance such as DOD, DHS, and FBI. (Mapped to ILO #1, ILO #5, ILO #6, ILO #7)

## CAREER OPPORTUNITIES

Information Technology (IT) Security Analyst, IT Security Operations, Information Security Analyst, Information Security Engineer, Network Security Analyst, SSA IT Specialist, Cyber Security Analyst, Cyber Security Advisor, Cyber Security Researcher, Cyber Security Data Analyst, Information System Security Officer (ISSO), and more.

## PROGRAM REQUIREMENTS

In total 39 credit hours must be completed.

### REQUIRED COURSES:

- » 3 Core Courses (9 credit hours)
- » Capstone course - Project or Thesis (3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
  - ITU Presents (1 credit hour)
  - ITU Nuggets (2 credit hours)

### ELECTIVE COURSES

A sufficient number of elective courses or Internship must be completed to bring the total of credit hours to 39.

A minimum 3.0 cumulative GPA (Grade Point Average) is required for granting of the Master's degree.

### CORE COURSES

- » ICS 501 Introduction to Cyber Security
- » ICS 502 Cyber Attack Countermeasures
- » ICS 601 Advanced Cyber Security

### CAPSTONE COURSES

- » ICS 690 Capstone Project
- or
- » ICS 695 Master's Thesis

### INTERNSHIP

- » INT 593 Internship (1 credit hour)

### ITU PRESENTS

- » PRE-500 ITU Presents (1/3)

\*Students must take three ITU Presents courses for a total of 1 credit hour.

### ITU NUGGET COURSES

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

### ELECTIVE COURSES:

- » With approval from the Computer Science Department any course from
  - Department of Business Administration
  - Department of Engineering Management
  - Department of Electrical and Computer Engineering
- » Internship: 1-8 credit hours
- » Transfer Credits: Up to 9 credit hours from a graduate program of a regionally accredited school with department chair's approval.

### ELECTIVE COURSES FOR THE THREE MS PROGRAMS

In each of the 3 MS programs (MSCS, MSICS, MSSE) Electives must be chosen from the list below so that the total number of credit hours

is at least 39. All electives count in each program, except when explicitly stated otherwise.

- » AMS 510 Linear Algebra
- » AMS 512 Applied Mathematics Methods
- » AMS 520 Optimization Techniques
- » AMS 530 Numerical Analysis
- » AMS 540 Discrete Mathematics
- » AMS 552 Probability, Statistics, and Reliability for Engineers
- » AMS 722 Advanced Applied Mathematics Methods
- » CSC 501 Discrete Structures
- » CSC 502 Principles of OS & Distributed
- » CSC 505 The UNIX/Linux OS
- » CSC 509 C Programming
- » CSC 511 OO Programming with C++
- » CSC 512 Data Structures
- » CSC 515 iPhone Application Development
- » CSC 518 OO Programming with Java
- » CSC 519 Android Phone Application Development
- » CSC 520 Python Programming
- » CSC 522 R Language Programming
- » CSC 525 HTML/CSS Programming
- » CSC 527 Mobile Web Programming
- » CSC 530 JavaScript Programming
- » CSC 532 Client Programming with JS/jQuery
- » CSC 535 Server Programming With PHP
- » CSC 545 Programming In GO
- » CSC 550 Big Data
- » CSC 555 Bio Informatics
- » CSC 560 Introduction to Data Science
- » CSC 575 Topics in Computer Science
- » CSC 580 Computer Algorithms
- » CSC 610 Ruby on Rails
- » CSC 615 Angular JS
- » CSC 620 Programming Language Theory
- » CSC 625 Advanced HTML5
- » CSC 630 Scala Programming
- » CSC 631 Data Mining
- » CSC 633 Machine Learning
- » CSC 640 Artificial Intelligence
- » CSC 650 Big Data Analytics (CPO-SAS/SPSS)
- » CSC 660 Advanced Data Science
- » CSC 680 Advanced Computer Algorithms
- » CSC 688 Special Topics (1 to 3 credit hours)
- » CSC 689 Independent Study (1 to 3 credit hours)

- » CSC 720 Formal Methods
- » CSC 730 Cryptography & Cryptanalysis
- » CSC 750 Coding Theory
- » ECE 502 Advanced Python Applications
- » ECE 503 AI Math fundamentals with Python application
- » ECE 505 Machine Learning Fundamentals
- » ECE 655 Deep Learning Fundamentals (Keras/TensorFlow 2.0, Pytorch)
- » ECE 656 Reinforcement Learning (Pytorch)
- » ECE 657 Natural Language Processing (Keras/TensorFlow 2.0, Pytorch)
- » ECE 660 Parallel Implementation of ML Algorithms with GPUs (Python Mumba programming, Cuda programming with C++)
- » ECE 661 AI application development in Engineering and Science (self-driving cars, advanced computer vision/face recognition, AI application in Cybersecurity)
- » ECE 662 AI application development in business (Fintech/algorithmic trading)
- » ECE 663 Machine Learning project deployment and production (dockers and Kubernetes, Edge AI, iPhone/Android deployment)
- » ICS 520 Personal Computer Security
- » ICS 525 Principles of Ethical Hacking
- » ICS 530 Cloud Computing Security
- » ICS 535 Cloud and Virtualization Security (CPO)
- » ICS 550 Security Policies
- » ICS 570 Web Security Fundamentals
- » ICS 620 Computer Malware
- » ICS 630 Digital Forensics Technology
- » ICS 670 Network & Data Security
- » ICS 680 Theory of Cryptographic Systems
- » ICS 688 Special Topics (1 to 3 credit hours)
- » ICS 689 Independent Study (1 to 3 credit hours)
- » SWE 500 Software Engineering
- » SWE 518 User Interface Design & Implementation
- » SWE 525 Version Control Tools/GIT
- » SWE 540 SQA/Manual Testing
- » SWE 542 SQA/manual/auto/perf Testing
- » SWE 544 SQA/Software Testing Tools
- » SWE 546 SQA/Performance Testing
- » SWE 550 Software Project Management (CPO-ACP)

- » SWE 560 Principles of Database Systems
- » SWE 561 Cloud Computing
- » SWE 562 Oracle Database Management/Administration
- » SWE 570 Internet of Things Architecture and Security
- » SWE 600 Advanced Software Engineering
- » SWE 602 Software Requirements Elicitation
- » SWE 632 Software Risk Management
- » SWE 633 Software Refactoring
- » SWE 680 Software Architecture
- » SWE 688 Special Topics (1 to 3 credit hours)
- » SWE 689 Independent Study (1 to 3 credit hours)

of computer science” will serve students as a foundation for computational thinking.

### **CSC 502 PRINCIPLES OF OS & DISTRIBUTED SYSTEMS (3)**

Prerequisites: None

The course begins with basic principles of a monolithic OS, as exemplified by Linux, Mac OS, and Windows, then advances to more sophisticated details of processes, preemptive multiprocessing, lightweight processes, and interrupts various types of interprocess communications, demons, file systems, signals, and paging, which are present on each independent node of the network. Then it advances to the specific software subsets on each node of the aggregate operating system composed of the multitude of nodes. Then it advances to the higher level of the global system management components given for each node that coordinate the nodes' activities to form a collaboration. Coordination of the cooperation of an individual node's kernel OS and management component by the management system. In a properly functioning integration the whole distributed system should exhibit transparency which means that it appears to the user as one single OS entity.

### **CSC 505 THE UNIX/LINUX OS (3)**

Prerequisites: Recommended knowledge of C Linus is a Unix like operating system that has been ported to more hardware platforms than any other OS. It is the leading OS on servers, big computers including supercomputers, embedded systems, and mobile devices such as android. This course focuses on the practical usage of the basic Linux operating system features. It introduces the student to the general principles of modern operating systems: preemptive multiprocessing; and of Linux in particular: shells, environment, shell variables, processes, threads, interprocess communication, the Unix file system, and shell scripts. Upon completion of this course the student will be able to work efficiently in a Linux or Unix environment, to tailor an environment to specific needs, to understand the basics of Linux system administration, to understand security risks, to write C programs that use system calls, and to write scripts for the C shell.

### **CSC 509 C PROGRAMMING (3)**

Prerequisites: None

The course is an introduction to the C language

## **COURSE DESCRIPTIONS**

This section lists all courses in the 3 above Masters Programs with course descriptions.

## **COMPUTER SCIENCE (CSC)**

### **CSC 501 DISCRETE STRUCTURES (3)**

Prerequisites: None

This course is about discrete structures and forms an introduction to the theoretical side of computer science. Discrete structures and discrete mathematics turn out to be the “calculus” of computer science--these are the structures that students will use to model real-world problems, to build algorithms upon, and to program with (both for modeling problems as well as use in data-structures and algorithms). In this course students will learn about various discrete structures (numbers, sets, relations, functions, trees, graphs), how to talk about them (propositional and predicate logic), how to prove things about them (using contradiction, construction, induction, combinatorics), and how to read and write literate formal mathematics. Students will also get a quick introduction to key applications to algorithmic analysis (like asymptotic worst-case running time analysis for algorithms). This “calculus

as per the chapters of the book by Kernighan & Ritchie. The key topics covered will be C basics including Control Flow, Functions, Pointers, Structures, Memory Allocation/DE Allocation, Input/output (command line & files). The course will be very hands-on and students will be expected to test code from C books (list will be given in class), and thus understand the concepts.

### **CSC 511 OO PROGRAMMING WITH C++ (3)**

Prerequisites: None

Recommended: Knowledge of C

This class teaches Objected Oriented Programming using C++. Prior exposure to C is helpful but not required as the basic concept of C programming will be reviewed. The topics covered include: Syntax of C++, classes and objects, encapsulation, inheritance, polymorphism, design for reuse, programming with objects, the standard template library, namespaces, exceptions, type casting, and file input/output.

### **CSC 512 DATA STRUCTURES (3)**

Prerequisites: None

Recommended: Knowledge of C++ or Java

This course discusses the definition, design, and implementation of abstract data structures, including arrays, stacks, queues, heaps, and linked structures. Other data structures include hash tables, trees, and graphs. Students will also learn algorithms for manipulating these structures, searching, and sorting, and the simpler graph algorithms. An introduction to the analysis of some sorting and searching algorithms is also covered.

### **CSC 515 IPHONE APPLICATION DEVELOPMENT (3)**

Prerequisites: None

This course provides a training in iPhone application development including: Introduction to Objective-C; iPhone technologies: multi-touch interface, accelerometer, GPS, maps, proximity sensor, dialer, address book and calendar. It helps students to understand the business aspects of an application development.

### **CSC 518 OO PROGRAMMING WITH JAVA (3)**

Prerequisites: None

This course focuses on the Java language as a tool for object-oriented programming. It introduces the student to the basic features of the Java language: primitive data types, terminal window-keyboard I/O, file I/O, classes, con-

structors and initialization, references vs. objects, access modifiers, memory maps, control structures, arrays, inheritance, function overloading and overriding, dynamic binding, interfaces, command line arguments, and exception handling. Some instruction to the platform-independent Java GUI API with Swing will be provided.

### **CSC 519 ANDROID PHONE APPLICATION DEVELOPMENT (3)**

Prerequisites: CSC 518

This course teaches the use of SDKs released by Google to facilitate the development of applications for the Android Phone. Android Phones are Linux based and are programmed in Java. This alone bodes very well for any software development on that platform: The Linux OS, the most powerful and easiest to manage of all operating systems, and the Java programming language with its superior GUI development capabilities. Knowledge of SDKs is certainly an advantage when developing for the Android platform.

### **CSC 520 Python Programming (3)**

Prerequisites: None

Programming and problem solving using Python. Emphasizes principles of software development, style, and testing. Topics include procedures and functions, iteration, recursion, arrays and vectors, strings, an operational model of procedure and function calls, algorithms, exceptions, object-oriented programming.

### **CSC 522 R LANGUAGE PROGRAMMING (3)**

Prerequisites: None

This course is an introduction to the R programming language, which is the premier language for statistical computing, machine learning, and data mining. Basic facilities of R contained in the course include mathematical, graphical, and interactive web applications. R is an open-sourced language used extensively in industry and in academia research. The course demonstrates methods for obtaining data from various sources, along with manipulating that data into a format that can be easily used in machine learning and data mining algorithms. The course covers a multitude of interactive visualization techniques along with the ability to share visualizations through web applications. This course provides insight into functional programming. The course covers reading and writing to and from various sources, R built in

data types, controlling the flow of execution, using operators, functions, and R packages. The course includes methods of sharing analytic results in professional formats used by technical journals.

### **CSC 525 HTML/CSS PROGRAMMING (3)**

Prerequisites: None

This course will examine how to create web pages using HTML code. The use of Cascading Style Sheets (CSS) will also be covered. Basic website development tools and website design will be studied through the creation of several HTML/CSS web site projects.

### **CSC 527 MOBILE WEB PROGRAMMING (3)**

Prerequisites: CSC 525, CSC 530

This course is for experienced front-end Web developers who'd like to learn what it takes to create great mobile experiences. In order to succeed in this class, they should be comfortable with HTML, CSS, and JavaScript, and should have experience creating Web apps, either professionally or for fun. This course will teach Web developers how to build Web experiences that adapt to the different screen sizes and capabilities that mobile devices offer, and how to scalably optimize media for mobile and desktop. This course will cover programming touch interaction, as well as how to optimize form field input for mobile devices and use APIs like geolocation and the accelerometer, and ensuring their web experiences work great when network conditions are suboptimal. They will gain the tools to investigate performance in mobile applications, with a strong understanding of mobile networking, battery usage patterns and optimizing paint techniques to build smooth animations on mobile. Upon completion, the web developers will understand what it takes to build great web experiences on mobile devices, have gained experience with the tools they need to test performance, and be able to apply their knowledge to their own projects in the future.

### **CSC 530 JAVASCRIPT PROGRAMMING (3)**

Prerequisites: CSC 525

This course introduces JavaScript as a programming language. It will talk about variables, data types, conditionals, loops, arrays, event handlers, objects, string, forms, cookies, and functions. It will teach students how to

use JavaScript to access and manipulate BOM (Browser Object Model) and DOM (Document Object Model), and how to use JavaScript to make Web pages interactive. It will teach students how to interact HTML, CSS, JavaScript, and DOM within a Web page.

### **CSC 532 CLIENT PROGRAMMING WITH JS/JQUERY (3)**

Prerequisites: CSC 525, CSC 530

jQuery is a JavaScript library designed to simplify the client-side scripting of HTML. It is designed to make it easier to navigate a document, select DOM elements, create animations, handle events, and develop Ajax applications. The topics of the course include: Basic jQuery syntax, jQuery element selectors, jQuery event handling, Ajax using jQuery, jQuery UI library.

### **CSC 535 SERVER PROGRAMMING WITH PHP (3)**

Prerequisites: CSC 525

PHP is one of the best server-side technologies for handling Web content easily and efficiently. PHP is a free, open-source language devoted primarily to handling dynamic web pages and used by millions of sites worldwide. It can be integrated with HTML and handle databases. The course starts with the development environment and the language syntax. It introduces the concepts of OOP in PHP at different levels. It also covers the interactions with HTML web pages and databases. PHP Ajax support is introduced as the advanced topic. Practical examples and sample codes will be given. Upon successful completion of this course, students will gain hands-on experience with PHP syntax and constructs such as variables, arrays, strings, loops, user-defined functions and how to integrate HTML and PHP code to manage and process data.

### **CSC 545 PROGRAMMING IN GO (3)**

Prerequisites: None

Go, also commonly referred to as golang, is a programming language developed at Google in 2007 by Robert Griesemer, Rob Pike, and Ken Thompson. It is a statically-typed language with syntax loosely derived from that of C, adding garbage collection, type safety, some dynamic-typing capabilities, additional built-in types such as variable-length arrays and key-value maps, and a large standard library. Go projects are for networking, distributed functions, or services: APIs, Web servers, min-

imal frameworks for Web applications, and the rest. In its weekday modality the course is taught over 15 weeks with 2 hours lecture and 1 hour lab per week.

### **CSC 550 BIG DATA (3)**

Prerequisites: Knowledge of Java

This course will introduce the basic concepts, tools, techniques, and applications. This course will cover the most up-to-date Big Data Technology including Hadoop Distributed File System (HDFS) and MapReduce engine as well as Business Intelligence tools.

### **CSC 555 BIO INFORMATICS (3)**

Prerequisites: None

Recommended: Knowledge of C++ or Java  
This course starts with a brief introduction to molecular biology. It then investigates the main algorithms used in Bioinformatics. After a brief description of commonly used tools, algorithms, and databases in Bioinformatics, the course describes specific tasks that can be completed using combinations of the tools and Databases. The course then focuses on the algorithms behind the most successful tools, such as the local and global sequence alignment packages: BLAST, Smith-Waterman, and the underlying methods used in fragment assembly packages. Lecture topics include Dynamic Programming for pairwise alignment; Hidden Markov Models for pattern recognition, conducting profile-based searches and trans-membrane protein structure prediction; phylogenetic tree construction and RNA structure prediction, and the use of SNPs and haplotypes in genomic variation, in pharmacogenomics, in genome-wide association studies and in personalized medicine. The course is self-contained and does not assume any background knowledge in biology, although an interest in molecular biology is helpful. The course will be complemented by hands-on, computer lab sessions that will allow the participants to practice with some of the major tools and databases. Students will solve hands-on problems on HIV, BRCA1 gene, Thalassemia, etc.

### **CSC 560 INTRODUCTION TO DATA SCIENCE (3)**

Prerequisites: None

A practitioner of data science is called a data scientist. Data science leverage all available and relevant data to effectively predict a model

that can be easily understood by non-practitioners. A major goal of data science is to make it easier for others to find and coalesce data with greater ease. Data science technologies impact how we access data and conduct research across various domains, including the biological sciences, medical informatics, social sciences and the humanities.

### **CSC 580 COMPUTER ALGORITHMS (3)**

Prerequisites: none

This course will cover algorithm design, sorting, searching, graph algorithms, stacks, queues, and dictionary implementations, divide and conquer algorithms, dynamic programming, randomized algorithms, amortized analysis, lower bound analysis, NP-Completeness.

### **CSC 610 RUBY ON RAILS (3)**

Prerequisites: None

Recommended: Knowledge of HTML, JavaScript, database

This course offers a comprehensive introduction to Ruby on Rails, an open source web application framework for the Ruby Programming language. Ruby on Rails makes it easy to build a modern Web application. It includes everything that is needed to build applications.

### **CSC 615 ANGULAR JS (3)**

Prerequisites: None

Recommended: CSC 530 or previous programming experience in JavaScript

AngularJS provides a layer on top of JQuery and DOM, reduces boilerplate code and improves maintainability. The best use of AngularJS is the consistent manner in which a new developer can generate the code for the structure and the layout. Once the structure is ready, the developer can concentrate more on look and feel rather than routine boiler plate code and cruft. The chapters covered include Introduction, Directives and Controllers, Unit Testing, Forms, Input and Services, Server Side communication using http.

### **CSC 620 PROGRAMMING LANGUAGE THEORY (3)**

Prerequisites: None

Recommended: Knowledge of Discrete Mathematics for Computer Science

This course provides an overview of common programming paradigms, including imperative, object-oriented, logic, and functional programming, and discusses the fundamental concepts

underlying the design, definition, and implementation of modern computer languages. Students will get practical experience with languages that exemplify a particular paradigm.

### **CSC 625 ADVANCED HTML5 (3)**

Prerequisites: CSC 525, CSC 530

This course is for Web developers who have solid experience in the basics of HTML5. This course will take the Web developers deep into the advanced techniques and functions that HTML5 has to offer. This course will first explore some JavaScript basics - writing to an HTML page, using variables and functions, interacting with HTML, looping and drag and drop functions. Then the course will continue by exploring how to utilize and create custom media controls. The course will cover the more popular CSS3 features such as transform, translation and animation, and HTML5 Form API, Canvas, Geolocation, Drag and Drop, Web Storage, Communication, Messaging, History, Offline, indexDB, File, Web Workers, and finally, HTML5 for Mobile Apps. Upon completion, the Web developers will have a deeper understanding of how to take advantage of the many new features and functions that HTML5 has to offer.

### **CSC 630 SCALA PROGRAMMING (3)**

Prerequisites: None

This course is an introduction to software programming using Scala, a programming language evolved from Java. The main advantage of Scala is its versatility. It has combined features of scripting language, objective oriented language and functional programming language. The last feature is particularly useful in Web and multicore applications that require concurrent data processing. Scala has been adopted by some leading high-tech companies. For example, in 2009, Twitter announced that it had switched large portions of its backend from Ruby to Scala and intended to convert the rest. To make learning easier, we will first introduce scala as a scripting language. We will then describe its objected oriented features (including class, object, inheritance, polymorphism, etc.) and finally move on to its main functional programming features

traction of hidden predictive information from large complex databases. It is a powerful new technology with enormous potential to help organizations and institutions extract and interpret important information. The course content includes the conceptual framework of data mining, descriptions and examples of standard methods used in data mining. Internet related data mining techniques are also covered. Data processing, statistical modeling, data warehousing and online analytical processing, data conditioning and cleaning, data transformation, text and web mining, mining massive datasets, data stream mining, data mining algorithms, association and correlation, pattern mining, classification, cluster analysis, outlier detection, knowledge discovery, knowledge representation, and validation.

### **CSC 633 MACHINE LEARNING (3)**

Prerequisites: None

Recommended: Knowledge of basic computer science principles and skills, probability theory, and linear algebra.

Machine learning is a fast-moving field with many recent real world commercial applications. The goal of Machine Learning is to build computer model that can produce useful information whether predictions, associations, or classifications. The ultimate goal for many machine learning researchers is to build computing systems that can automatically adapt and learn from their experience. This course will study the theory and practical algorithms in Machine Learning. It reviews what machine learning is about, how it evolved over the past 60 years, why it is important today, basic concepts and paradigms, what key techniques, challenges and tricks. It also covers examples of how machine learning is used/applied today in the real world, and expose students to some experience in building and using machine learning algorithms. This course will also discuss recent applications of machine learning, such as to robotic control, speech recognition, face recognition, data mining, autonomous navigation, bioinformatics, and text and web data processing.

### **CSC 640 ARTIFICIAL INTELLIGENCE (3)**

Prerequisites: None

Recommended: Knowledge of Discrete Mathematics

This course introduces the foundation of simu-

### **CSC 631 DATA MINING (3)**

Prerequisites: None

This course provides an introduction to the theoretical concepts and practical applications of data mining. Data mining facilitates the ex-

lating or creating intelligence from a computational point of view. It covers the techniques of reduction, reasoning, problem solving, knowledge representation, and machine learning. In addition, it covers applications of decision trees, neural networks, support vector machines and other learning paradigms.

### **CSC 650 BIG DATA ANALYTICS (CPO-SAS/SPSS) (3)**

Prerequisites: CSC 550

This course emphasizes the key aspects of data analytics for students intending to pursue certain professional certification, i.e., SPSS or SAS, upon the completion of the course. The first module introduces the fundamental statistical thinking to the computer scientist, including probability, random variables, and statistical inference. Then, predictive modeling techniques, such as linear and logistic regression, are covered to make transition to the supervised and unsupervised data mining techniques. In the last module of the course, some popular big data platforms, namely, Hadoop/Mahout and Spark/MLlib, are discussed from the data analytics point of view. Examples from the text and social media mining application are covered in the second and the third module. The commercial software (student version) is required and used through the first and second modules, such that the students can be fluent in the application to meet the certification requirement thus limited programming requirement.

### **CSC 660 ADVANCED DATA SCIENCE (3)**

Prerequisites: CSC 560

Recommended: Knowledge of R Language  
This course builds on Introduction to Data Science by introducing the idea of data products and encouraging students to build products based on data analyses.

### **CSC 680 ADVANCED COMPUTER ALGORITHMS (3)**

Prerequisites: none

This course covers advanced methods of algorithmic design, analysis, and implementation. Techniques to be covered include amortization, randomization, network flow, linear programming, approximation algorithms, computational complexity, and NP completeness analysis. Domains include FFT, number theoretical algorithms, RSA encryption - decryption, various breaking attempts (factorization), primality checking, Diffie-Hellman key exchange, El-

Gamal encryption, algebra-based encryptions such as AES, cryptographic hash functions, pattern matching, and bioinformatics.

### **CSC 688 SPECIAL TOPICS (3)**

Prerequisites: None

Special topics courses cover subjects not currently contained in the curriculum, but are designed to address especially relevant trends or developments related to the discipline.

### **CSC 689 INDEPENDENT STUDY (1-3)**

Prerequisites: None

Independent Study allows students to explore academic areas of special interest not provided in the existing curriculum. It is carried out under the guidance of a member of the faculty.

### **CSC 690 CAPSTONE PROJECT (3)**

Prerequisites: Department approval and completion of 27 credit hours of the MSSE program  
A capstone is the summative component of the master's degree program submitted by a graduate student. The Capstone Project is designed to demonstrate the in-depth learning and higher-order thinking of the student. It is meant to be an analysis of knowledge, breaking the information down into its component parts, and also the synthesis of new knowledge, assembling the parts into a new coherent whole. The capstone is also meant to be practical and useful. The student should choose an area that is uniquely and personally important and research or perform a project in that area. The Capstone Project is performed by arrangement with the project advisor. The student must conduct independent research in an approved topic in software engineering, prepare a report and defend it before a faculty advisor.

### **CSC 695 MASTER'S THESIS (6)**

Prerequisites: Department Chair approval and completion of 27 credit hours of the MSSE program.

The master's thesis must be arranged with the capstone thesis advisor. After the topic is approved independent research in computer science toward the MS degree must be conducted. The research must result in some new insights into the academic or practical concepts of the CS world. These must be analyzed, explained, and documented in the thesis. After completing the thesis, the student must defend it before a committee of faculty appointed by

the Department Chair.

### **CSC 720 FORMAL METHODS (3)**

Prerequisites: None

This course will focus on fundamental mathematical models of computation. It will discuss both the inherent capabilities and limitations of these computational models as well as their relationships with formal languages. Rigorous arguments and proofs of correctness will be emphasized. Particular topics to be covered include: (1) Finite automata, regular languages, and regular grammars. (2) Deterministic and nondeterministic computations on various automata. (3) Context free grammars, languages, and pushdown-automata. (4) Turing machines, Church's thesis, and undecidable problems.

### **CSC 730 CRYPTOGRAPHY & CRYPTANALYSIS (3)**

Prerequisites: None

This course analyzes ways to protect information during transfer in computer systems and networks. It includes the mathematics of cryptography, Number theoretical concepts, RSA theory, Diffie-Hellman key exchange, ElGamal Discrete Logarithm and their application and use in distributed systems, secure internet services, digital signature, intrusion detection and firewalls; coding based encryption; post-quantum cryptography. Some factoring methods to be studied include Fermat, Pollard Rho, and Elliptic Functions.

### **CSC 750 CODING THEORY (3)**

Prerequisites: AMS 750

This class gives an introduction to coding theory. This course introduces examples for codes (ISBN, UPC, etc.) including binary codes, the meaning of important code parameters, detecting errors, correcting errors, sphere packing bound, and binary linear codes. Abstract algebra: fields and vector spaces, polynomial extensions of GF(2). Encoding linear codes: Introduction to generator matrices and parity check matrices, Hamming codes. Linear Algebra over GF(2), nullspace of a matrix, relation between generator and parity matrix. Error correcting codes, cyclic codes (BCH and Reed-Solomon codes), Goppa codes; syndrome decoding, the Patterson Algorithm.

## **INFORMATION AND CYBER SECURITY (ICS)**

### **ICS 501 INTRODUCTION TO CYBERSECURITY (3)**

Prerequisites: None

Overview of the field of Cyber Security: history and basics of cryptography, risk and data management, fundamental concepts, preventative measures, rules, regulations and legal issues, security testing and assessment, identity and access management, database security, computer ethics, digital signatures.

### **ICS 502 CYBER ATTACK COUNTERMEASURES (3)**

Prerequisites: ICS 501

Countermeasures for the preventing of cyber-attacks. Firewalls – design, types and comparisons, intrusion detection, network access controls, network and browser encryption, network management, and secure systems development, cloud security.

### **ICS 520 PERSONAL COMPUTER SECURITY (3)**

Prerequisites: None

Beginner's computer security course for small office or home users. Learn to stop hackers, worms, viruses, spyware, web bugs and identity theft. Learn vulnerabilities found in web browsers, email and operating systems. Protect against online purchase dangers, install firewalls, manage cookies, restrict ports, analyze log files, evaluate wireless networks and examine encryption.

### **ICS 525 PRINCIPLES OF ETHICAL HACKING (3)**

Prerequisites: None

Recommended: Knowledge of C++, Java, or Python

In this course students will learn and practice hacking techniques used by malicious, black-hat hackers as a means to learn best defense from these same hackers. The course is an in-depth study using hands-on lab exercises. While these hacking skills can be used for malicious purposes, this course teaches you how to use the same hacking techniques to perform a white-hat, ethical hack, on your organization. The course trains for the CEH (Certified Ethical Hacker Certificate). Students will be trained to penetrate, test and hack their employers' own computer system in order to safeguard it from real (malicious) hackers. The Ethical Hacker is a trustworthy employee of an organization trained to attempt to penetrate networks and/or computer systems by using the same

methods and techniques as a malicious hacker. Through this the individual can learn and master the malicious hackers methods find the weak pointes in an organization's network or computer systems and build safeguards against hacking attempts. The CEH is the most desired information security training program for any IT security professional.

### **ICS 530 CLOUD COMPUTING SECURITY (3)**

Prerequisites: SWE 561

This class provides students a comprehensive understanding cloud security fundamentals and advanced expertise in cloud environments. Starting with a detailed description of cloud computing, the course covers all major domains in the latest Guidance document from the Cloud Security Alliance, and the recommendations from the European Network and Information Security Agency (ENISA) with expanded material and extensive hands-on activities. Students will learn to apply their knowledge as they perform a series of exercises as they complete a scenario bringing a fictional organization securely into the cloud.

### **ICS 535 CLOUD AND VIRTUALIZATION SECURITY (CPO) (3)**

Prerequisites: SWE 561

This course introduces the concepts and techniques of implementing and securing cloud computing through the use of virtualization and distributed data processing and storage. Topics include operating system virtualization, distributed network storage, distributed computing, cloud models (IAAS, PAAS and SAAS) and techniques for securing cloud and virtual systems. Practical experience of integrating private, public, and hybrid clouds and virtual servers securely into an existing IT infrastructure will also be covered.

### **ICS 550 SECURITY POLICIES (3)**

Prerequisites: None

The policies governing administration, management and enforcement of security issues are a separate, necessary element of Cyber Security, not based on some other more fundamental Cyber Security topic. They relate to network security, server security, application security. Explain the vulnerability of small firms. Examples: Policies for enforcing encryptions and strong passwords. Rewards for followers, punishment for non-followers; information in all its forms will be protected from unautho-

rized modification. All existing systems will be equipped with approved antivirus software. All new equipment and software will be controlled before installation. Set antivirus software for automatic update. No foreign equipment, including private USB thumb drives, are allowed to be used. Employees must know the policies.

### **ICS 570 WEB SECURITY FUNDAMENTALS (3)**

Prerequisites: None

Recommended: Knowledge of HTTP, TCP/IP, SQL, and operating systems

This course introduces students to the fundamentals of computer security as the first step towards learning how to protect computers from hackers. The course begins by explaining the very basic concepts of computer security and provides substantial technical details to keep students interested and involved. It includes hands-on labs and graded and non-graded assignments for each unit that provide an opportunity to practice what the students learn. It also includes a few security games to make learning more exciting and interactive. Students are expected to be familiar with standard computer operations (e.g., login, cut & paste, email attachments, etc.) before enrolling in the course. This course will give students a clear vision on how all seven layers will work in IOS model and different levels of security in each layer.

### **ICS 601 ADVANCED CYBER SECURITY (3)**

Prerequisites: ICS 501

Cryptographic systems, communications and network security, security operations, security in the SW life cycle, investigations, resource protection, incidence response, implications of quantum computing.

### **ICS 620 COMPUTER MALWARE (3)**

Prerequisites: ICS 520

Definition of computer malware (viruses, worms, Trojan horses, rootkits, backdoors), Infectious malware, the functioning of malware, coding of malware, self-replication, techniques for evading detection; reasons for vulnerability to malware; anti-malware strategies, anti-virus software. Dangers of malware: identity theft, file and data corruption industrial espionage.

### **ICS 630 DIGITAL FORENSICS TECHNOLOGY (3)**

Prerequisites: None

Recommended: ICS 520

General tools and techniques used in forensic analysis, investigating digital media and physical memory for securing evidence in criminal investigations, investigating computer crime; digital forensic software, mobile forensic analysis.

### **ICS 670 NETWORK & DATA SECURITY (3)**

Prerequisites: None

Recommended: Knowledge of Information Assurance Fundamentals and Data communications

The course covers theory and practice of the security aspects of the web and Internet. It surveys cryptographic tools used to provide security, such as shared key encryption (DES, 3DES, RC-4/5/6, etc.); public key encryption, key exchange, and digital signature (Diffie-Hellmann, RSA, DSS, etc.). It then reviews how these tools are utilized in the internet protocols and applications such as SSL/TLS, IPSEC, Kerberos, PGP, S/MIME, SET, and others (including wireless). System security issues, such as viruses, intrusion, and firewalls, will also be covered.

### **ICS 680 THEORY OF CRYPTOGRAPHIC SYSTEMS (3)**

Prerequisites: ICS 601

A deeper coverage of modern encryption system and the necessary mathematics. Classical cryptographic constructions, basic cryptographic algorithms, symmetric cryptography; public-key cryptography: RSA, AES (Rijndael) stream cypher, Diffie-Hellman, El Gamal, coding based cryptography: McEliece – Niederreiter. Basic issues and concepts of Network and Data Security such as data confidentiality, data and user authenticity, data integrity, key management and distribution; digital signatures.

### **ICS 688 SPECIAL TOPICS (1-3)**

Prerequisites: None

Special topics courses cover subjects not currently contained in the curriculum, but are designed to address especially relevant trends or developments related to the discipline.

### **ICS 689 INDEPENDENT STUDY (1-3)**

Prerequisites: None

Independent Study allows students to explore academic areas of special interest not provided in the existing curriculum. It is carried out under the guidance of a member of the faculty.

### **ICS 690 CAPSTONE PROJECT (3)**

Prerequisites: Department approval and completion of 27 credit hours of the MSSE program. The capstone project is a report, analysis, project, or program, submitted by a graduate student. It is designed to demonstrate the in-depth learning and higher-order-thinking of the student. It is meant to be an analysis of knowledge, breaking information down according to the analytical strength of the student's thinking as well as synthesis of knowledge and assembling the parts into a new coherent whole.

### **ICS 695 MASTER'S THESIS (6)**

Prerequisites: Department chair approval and completion of 27 credit hours of the MSSE program.

The master's thesis must be arranged with the capstone advisor. After the topic is approved independent research in Information Security toward the MS degree must be conducted. The research must result in some new insights into the academic or practical concepts of the Information Security world. These must be analyzed, explained, and documented in the thesis. After completing the thesis, the student must defend it before a committee of faculty appointed by the department chair.

## **SOFTWARE ENGINEERING (SWE)**

### **SWE 500 SOFTWARE ENGINEERING (3)**

Prerequisites: None

In this class, students will learn the elements of engineering and the relationship of engineering to software practice. It also covers how those principles and practices apply to the design, development, and maintenance of software throughout the entire software lifecycle. The course introduces traditional and contemporary approaches to software engineering practice. These include: requirements development, architecture and detailed design, modeling, testing strategies, process selection, project management, how to interact with other engineers on large-scale systems, and more. This course includes a capstone team where students gain practical experience designing a software system from start to finish using software modeling techniques such as UML, as well as a variety of project management methods and tools. This is not a programming course, but a background in object-oriented programming (OOP) will be valuable in helping the student understand the demands of the capstone project.

## **SWE 518 USER INTERFACE DESIGN & IMPLEMENTATION (3)**

Prerequisites: None

This course introduces the principles of user interface development and the iteration of design-implementation-evaluation. It will study the important design principles to design good UI. Students will see different techniques for prototyping user interfaces and learn techniques for evaluating and measuring usability.

## **SWE 525 VERSION CONTROL TOOLS/GIT (3)**

Prerequisites: None

This course is designed to make the participants experts in git tool. It starts with fundamental concepts like git branch and continues to advanced topics like design and git work flow. The course covers different components of git and github and how they are used in software development operations. The course also covers Installation & Configuration of github and other tools and techniques like github desktop, SourceTree and Sparkle share as well. Participants will also get to implement one project towards the end of the course. Companies use git for creating and managing open source API's and to help the open source community. It is github, a git repository hosting service founded just a few years ago to build software better, together. Most of the high paying companies are using git and github for their new, innovative and upcoming Software Languages. Open source software can now be made using github and you will be able to share your repositories with other developers so that they can also contribute. github concepts can be implemented in Big Data and Hadoop technology, Java Projects and other frameworks as well. Some of the trending repositories in github are Scala and AngularJS.

## **SWE 540 SQA/MANUAL TESTING (3)**

Prerequisites: None

This course is a comprehensive introduction to Software Testing and Quality Assurance. The following topics will be taught: Software Development Methodologies, The Role of Quality Assurance in a Software Development Life Cycle, Common Software Testing Life Cycles, Software Testing Types and Definitions, Test Planning, Test Design, Test Cases Development, Test Execution & Results Analysis, and Test Matrices.

## **SWE 542 SQA/MANUAL/AUTO/PERFORMANCE TESTING (3)**

Prerequisites: None

Testing of software can be done in both Automation and Manual testing method, but it totally depends on the project requirement, budget associated with the project, and which testing method will be benefited to the project. Automation Testing is a method which uses automation tools to run tests that repeat pre-defined actions, matches the developed program's probable and real results. Manual testing is a method used by software developers to run tests manually. This course will teach the following: Software testing concepts; Black Box Testing, White Box Testing, Integration Testing, System Testing, Unit Testing, and Acceptance Testing; and Test Management tools: QC/ALM, Defect tracking tool, Jira and automation tool, and QTP/Selenium.

## **SWE 544 SQA/SOFTWARE TESTING TOOLS (3)**

Prerequisites: None

This course introduces the QA with test methodologies and procedures. During the course, the students go through the Manual Testing and Automation of Client/server and web based applications. The course will quickly build through each of these concepts and configuration so that by the final day of class, each student will have fully tested the application manually and convert manual test cases into automation scripts. In doing so, the students will focus on different aspects and become acquainted with additional functions.

## **SWE 546 SQA/PERFORMANCE TESTING (3)**

Prerequisites: None

This course provides an introduction to the complexities of software performance testing and delivers testing skills that participants can immediately apply back on the job. The following topics will be addressed: understand the performance testing process: planning, preparation, execution, and reporting; relate performance testing to the development process; understand performance goals and objectives; learn how to deal with environment and architecture issues; define operational profiles and load definitions; understand and select the various types of performance tests; and define and select appropriate measurements.

## **SWE 550 SOFTWARE PROJECT MANAGEMENT**

### **(CPO-ACP) (3)**

Prerequisites: None

This course provides an overview of software project management history, culture, methodologies, leadership, and strategic planning. The course introduces important tools, such as work breakdown structure, scheduling, earned value analysis, and risk management. Case studies from a variety of organizational settings are discussed. The course discusses the 5 processes that must be done for traditional project management success: (Define, Organize, Execute, Control, and Close) and Complex Project Management (Agile PM and Extreme PM). The strategic implications of projects will be considered with respect to the organizational vision. The course follows the Project Management Body of Knowledge (PMBOK) of the Project Management Institute (PMI) and allows the students to prepare for the examinations for the Agile Certified Practitioner ACP. The course focuses on the concepts and tools of the different software project management elements. It first sets the software project management framework and describes the different steps in the software project management process. Next, all the key management aspects of a software project are addressed: integration, scope, time, cost, quality, human resources, communications, risk, procurement, and stakeholder.

### **SWE 560 PRINCIPLES OF DATABASE SYSTEMS (3)**

Prerequisites: None

This is an advance level course on the principles of database systems. Main topics include, but are not limited to: an overview of the relational data model and relational query languages; recursive queries, datalog, and fixed-points; query processing and optimization; database design, dependencies, normal forms, and the chase procedure. Additional topics may include: information integration, complex objects, semistructured data, and XML.

### **SWE 561 CLOUD COMPUTING (3)**

Prerequisites: None

Recommended: Knowledge of Operating Systems

Introduction to cloud computing, cloud architecture and service models, the economics and benefits of cloud computing, horizontal/vertical scaling, thin client, multimedia content distribution, multiprocessor and virtualization,

distributed storage, security and federation / presence/ identity/ privacy in cloud computing, disaster recovery, free cloud services and open source software, and example commercial cloud services.

### **SWE 562 ORACLE DATABASE MANAGEMENT/ ADMINISTRATION (3)**

Prerequisites: None

This course introduces Oracle as a practical example of a widely used database system, teaches basic database concepts, data definition and manipulation languages (SQL), general architecture of database management systems, transaction management, concurrency control, security, distribution, and query optimization.

### **SWE 570 INTERNET OF THINGS ARCHITECTURE AND SECURITY (3)**

Prerequisites: None

The objective of the course is to introduce students to the principles, technology and applications of the Internet of Things (IoT). The course includes a coverage of the key principles and building blocks of IoT (architecture), the key enabling technologies (devices, networking and management), and the issues of security of the IoT systems. At the end of this course the student would be able to describe the key IoT technologies in detail, explain issues in developing large-scale IoT systems, explain applications of IoT and demonstrate a deep understanding of at least one IoT research topic.

### **SWE 600 ADVANCED SOFTWARE ENGINEERING (3)**

Prerequisites: SWE 500

This class goes into greater depth in learning the practices and principles of software engineering. The course also includes a brief review of some of the material from SWE 500. In this course, we expand our understanding of software modeling to include real time, concurrency, and embedded systems software engineering. It also goes into more depth in software metrics, project estimation techniques, risk management, software reliability, new and emerging directions for software development. This is also a team-oriented capstone project course, and one of the deliverables at the end of the semester is a fully-formed, professional level software design from the project team.

## **SWE 602 SOFTWARE REQUIREMENTS ELICITATION (3)**

Prerequisites: SWE 500

Requirements Elicitation is the process of identifying the real problems that the software stakeholder tries to solve, of defining a system and its technical environment, and of identifying the requirements of that system such that it solves these problems for users, customers and other stakeholders. The objective of the class is to prepare software engineers for the task of developing effective requirements under a variety of development modalities. The student, at the conclusion of this course, will understand requirements engineering for Waterfall, V-Model, Spiral Model, Agile Methods, Cleanroom Engineering, the [Rational] Unified Process, as well as other approaches. The student will also understand, and gain experience with, the Unified Modeling Language, including use cases and other facilities of UML. Finally, it will introduce the student to the concepts necessary to moving from requirements to architecture, to design, to implementation. This is not a design or programming course, but an understanding of the principles and practices of software engineering are essential for the software requirements engineer. (*Including currying, pattern matching, lazy evaluation, tail recursion, immutability, etc.*)

## **SWE 632 SOFTWARE RISK MANAGEMENT (3)**

Prerequisites: None

This course introduces the field of software risk management which includes the software estimation, planning and control process. Risk management in software includes critical factors that impact estimates, methods for selecting metrics and measures, proper software sizing, as well as processes that identify and manage risks in the software development process as well as the operational phase of the software life cycle. Risk management and software estimation and measurement, when used properly in the software engineering context expedite the software estimation process, help generate more accurate estimates, and contribute to safe and resilient software engineering projects. Risk techniques also mitigate safety and security issues and form a total software success paradigm for software development projects.

## **SWE 633 SOFTWARE REFACTORING (3)**

Prerequisites: SWE 500

Software Refactoring is a change made to the internal structure of software to make it easier to understand and cheaper to modify without changing its observable behavior (Fowler 1999). Improving the design of existing code. Various techniques and refactoring patterns. Increasing software understandability and productivity, reducing software complexity, aging, and maintenance costs. Refactoring in the context of agile development, during debugging and code review. Refactoring tools for important languages and OSs. Various categories of refactoring, small and big refactoring. Refactoring of UML design models.

## **SWE 680 Software Architecture (3)**

Prerequisites: SWE 600

Every computer software system has an architecture, even if it is an ad hoc architecture. Modern software systems are larger, include more interoperability of their components, and often involve many programmers and engineers, working together to achieve a predictable design. When there is no coherent architecture for the design, the engineers and programmers often find themselves working at cross-purposes, constantly reworking their product to satisfy previously undefined requirements. This class is focused on the high-level concern of the architecture of a software system. Therefore, we will not be doing any computer programming. The course interests will include the requirements development, system context, and relationships between the various components and structures in a software architecture. At the end of this course students will be prepared to participate in a software (or systems) engineering project at the high level of development where they design the fundamental architecture for that system. Students will understand requirements development, project strategies and tactics, patterns of architecture, and architectural styles and idioms.

## **SWE 688 SPECIAL TOPICS (1-3)**

Prerequisites: None

Special topics courses cover subjects not currently contained in the curriculum, but are designed to address especially relevant trends or developments related to the discipline.

## **SWE 689 INDEPENDENT STUDY (1-3)**

Prerequisites: None

Independent Study allows students to explore

academic areas of special interest not provided in the existing curriculum. It is carried out under the guidance of a member of the faculty.

### **SWE 690 CAPSTONE PROJECT (3)**

Prerequisites: Department Chair approval and completion of 27 hours of the MSSE program. The capstone project is a report, analysis, software project, or program, submitted by a graduate student. It is designed to demonstrate the in-depth learning and higher-order-thinking of the student. It is meant to be an analysis of knowledge, breaking information down according to the analytical strength of the student's thinking as well as synthesis of knowledge and assembling the parts into a new coherent whole.

### **SWE 695 MASTER'S THESIS (3)**

Prerequisites: Department Chair approval and completion of 27 credit hours of the MSSE program.

The master's thesis must be arranged with the master's thesis advisor. After the topic is approved independent research in software engineering toward the MS degree must be conducted. The research must result in some new insights into the academic or practical concepts of the SE world. These must be analyzed, explained, and documented in the thesis. After completing the thesis, the student must defend it before a committee of faculty appointed by the Department Chair.

### **INTERNSHIP (INT)**

#### **INT 593 PART/FULL TIME INTERNSHIP (1/3- 3)**

Prerequisites: None

This course consists of participation in a full-time or part-time internship experience, related to the student's field of study under the supervision of both an approved internship provider and a faculty advisor. This course provides practical, hands-on training in a relevant industry to enhance classroom learning. A maximum of 10 credit hours earned in INT 593 may be applied toward the Master's Degree graduation requirements.

### **NUGGETS - IDS (INTERDISCIPLINARY SCIENCES)**

#### **IDS 550 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course.

Nuggets are a modular course content, following all the same structured and quality assess-

ment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 551 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course.

Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 552 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course.

Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 553 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course.

Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule.

Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 554 ITU NUGGETS (COSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course.

Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 555 ITU NUGGETS (COSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a

### **BACHELOR OF SCIENCE IN COMPUTER SCIENCE COMPLETION**

*\*Pending WSCUC approval*

*This program is a Bachelor of Science completion program. It provides in essence the courses that a four-year BS program in Computer Science in the U.S. requires in the Junior and Senior years and is designed primarily for students who have completed an Associate Degree for Transfer at a California Community College. It is designed to also allow entry to students from other US states and from other countries as long as they have an educational background that corresponds to the first two years of a U.S. undergraduate degree.*

*If any essential requirements are missing with respect to the first two years of a U.S. under-*

*graduate program, students can fulfill these requirements by taking and passing the corresponding classes at some Community College, at the same time they start the completion program at ITU. See below for details.*

*Only two more years of University study have to be completed to get the BSCS degree.*

#### **BSGS Program Learning Outcomes**

Graduates of the BSCS program will:

1. Be able to analyze a given computing problem and to apply practical computing principles to identify solutions.
2. Apply theoretical knowledge of computer science and SWEBOk to produce software-based solutions
3. Be aware of professional responsibilities and make informed judgments that are based on computing, ethical and legal principles
4. Communicate computing related questions and problems effectively in a variety of professional contexts
5. Design, implement, and assess a software-based solution that meets a given set of computing requirements
6. Collaborate effectively as a member or leader of a team working in computer science related or software producing activities
7. Contribute effectively to development in all areas that are subject to computerization

#### **PROGRAM REQUIREMENTS FOR BSCS**

Overall, the student must complete 60 trimester units of courses as described below:

#### **ALL OF THE FOLLOWING REQUIRED COURSES**

- CSC 330 Professional Responsibilities
- CSC 340 Introduction to Computer Architecture
- CSC 350 Introduction to Data Base Systems
- CSC 360 Introduction to the Linux OS
- CSC 370 Introduction to Software Engineering
- CSC 385 Introduction to Data Structures and Algorithms
- CSC 390 Introduction to OO Programming
- CSC 405 Introduction to Computer Networks
- CSC 420 Introduction to Systems

**Programming**  
**CSC 440 Introduction to Programming**  
**Language Theory**  
**CSC 450 Mathematics for Computing**  
**CSC 460 Computer Graphics I**  
**CSC 490 Senior Project**  
**CSC 495 Practicum**

The student must complete 18 units from the technical or general elective courses listed below:

**TECHNICAL ELECTIVE COURSES**

**CSC 310 Introduction to Internet Programming**  
**CSC 320 Python Programming**  
**CSC 330 Introduction to Artificial Intelligence**  
**CSC 380 Introduction to Parallel Programming**  
**CSC 395 Introduction to Web Technologies**  
**CSC 398 Mobile Application Development**  
**CSC 408 Network Security**  
**CSC 410 Network Administration**  
**CSC 415 Introduction to Data Science**  
**CSC 470 Computer Graphics II**  
**CSC 395 Special Topics**

single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

**PRE-500 ITU PRESENTS (1/3)**

**Prerequisites: None**

ITU Presents, formerly “Joint Seminar,” was created and first taught by ITU’s Founder, Professor Shu-Park Chan, who invited guest speakers, typically Silicon Valley industry leaders, to speak on topics of their personal interest followed by a Q&A session with ITU students. Historically, ITU Presents remained the favorite and reportedly “most useful” class of ITU alumni, as it gave ITU students the ability to listen to the real-life experiences of famous technologists who often shared their early career struggles, strategies, and successes with students.

**CSC 480 Special Topics**

**ADMISSION REQUIREMENTS**

All applicants must submit the following as evidence of their academic background and abilities:

An AS-T degree in Computer Science or a related discipline from a California Community College (CCC)

-OR- an ADT degree from a CCC with evidence of all general education classes completed with a grade of C or better including coursework in the following five areas:

1. English Composition
2. Speech/Oral Communication
3. Critical Thinking
4. College Level Mathematics (with intermediate algebra as prerequisite)
5. Introduction Computer Science or Computer Programming

-OR- a transcript from a regionally accredited US college/university - with evidence of sixty or more semester credits in Computer Science or in a related discipline, including 30 semester units (45 quarter units) of general education with a grade of C or better, including coursework in the following five areas:

1. English Composition
2. Speech/Oral Communication
3. Critical Thinking
4. College Level Mathematics (with intermediate algebra as prerequisite)
5. Introduction to Computer Science or Computer Programming

-OR- a degree or diploma from a non U.S. college that is recognized by that nation’s Ministry of Education, and is equivalent to sixty semester credits or more in Computer Science or a related discipline, including coursework in the following five areas:

1. English Composition
2. Speech/Oral Communication
3. Critical Thinking
4. College Level Mathematics (with intermediate algebra as prerequisite)
5. Introduction to Computer Science or Computer Programming

**Transcripts**, listing courses taken and grades received, must be mailed directly from the institution or through a verified e-Transcript provider. ITU has partnered with Parchment for

e-Transcript submissions.

**International Applicants** must also adhere to the following additional requirements:

**Foreign credential evaluation for any non-US degrees.** ITU will accept foreign transcript evaluations from these approved third-party service providers: World Education Services (WES), A2Z Evaluations, International Education Research Foundation (IERF), and other NACES-recognized members.

**Proof of English proficiency.** Students may demonstrate English proficiency through one of the following ways:

- Test of English as a Foreign Language (TOEFL) examination. ITU looks for a score of 72\* or better for the internet-based test (ibt).
- International English Language Testing System (IELTS Academic) examination. ITU looks for a band score of 6.0\* or better for the academic module.
  - Accredited bachelor's or master's degree from a regionally accredited US institution or from a native English-speaking country.
  - Evidence that the applicant's first language is English. Applicant should submit documentation that s/he was schooled in a country where English is the official language and language of instruction.
  - Transcript demonstrating the completion of an accredited ESL program in the US, or in a non-US Anglophone country, with a proficiency level equivalent to a B2 or above, according to the Common European Framework (CEFR).
    - MTELP (Michigan Test of English Language Proficiency)
    - Evidence of achievement of Level 4 Proficiency with a score of 425 or above on the China College English Test (CET)

## **COURSE DESCRIPTIONS**

This section contains course descriptions for some of the courses in the BSCS completion program.

### **CSC 301 PROFESSIONAL RESPONSIBILITIES**

**(3)**

Prerequisites: None

The focus of the course is on ethical, legal, and moral responsibilities of computer scientists in the workplace. Computing systems often obscure accountability, but responsibility of a computer scientist for created software etc. still exists in an ethical, legal and moral sense. Responsibilities are described, explained and elucidated with practical examples.

### **CSC 310 INTERNET PROGRAMMING (3)**

Prerequisites: None

This class is an introduction to not only server-side programming techniques used to develop interactive web sites, but also some client side web page development is presented and practiced. Students learn to create web sites that interact with web servers, manage user sessions, and store and retrieve data from databases. Languages such as PHP and MySQL are used. Course content changes and is updated to reflect the current state of the art in Internet programming.

### **CSC 320 PYTHON PROGRAMMING (3)**

Prerequisites: Moderate computer experience. This course starts with covering the basics of creating a Python program. It explains and practices the fundamental syntax and semantic structures of the language. Recommended textbook: Python by example, Dr. R. Riehle, 2020. Students who complete this course, will be ready for more advanced programming courses. A Python version higher than 3.0. will be used.

### **CSC 340 COMPUTER ARCHITECTURE (3)**

Prerequisites: None

Computer architecture is a set of rules and methods that describe the functionality, organization, and implementation of computer systems. It involves instruction set architecture design, micro-architecture design, logic design, and implementation. It also includes the science and art of selecting and interconnecting

hardware components and designing the hardware/ software interface to create a computer that meets functional, performance, cost, and other specific goals. This course introduces the basic hardware structure of a modern programmable computer, including the basic laws underlying performance evaluation.

### **CSC 350 DATA BASE SYSTEMS (3)**

Prerequisites: None

Methodology of developing database applications for real world uses. Understanding and applying the theoretical foundation of relational databases and query languages to create SQL queries and data structure definitions to meet the given requirements.

### **CSC 360 THE LINUX OS (3)**

Prerequisites: None

The UNIX-Linux operating systems are available in many computing environments, from small microcomputers and virtual computers, to the largest supercomputers, and has gained widespread commercial acceptance with its multi-user and multitasking abilities. This course introduces the UNIX and Linux operating system's user interface. Students learn common commands; practice displaying, copying, moving, and removing files and directories; and discover how to protect data by setting file metacharacters, redirection, and piping symbols at the command line. Other topics include full-screen text editing with VI, different supported communication paradigms, simple shell programming, and Shell features. In this class students will implement group projects to gain hands-on-experience skills.

### **CSC 380 DATA STRUCTURES (3)**

Prerequisites – Knowledge of the Python programming language and of the fundamentals of Computer Science as covered in the first 2 years of a BS program in Computer Science. This course presents, explains and practices the data structures that are most important in Computer Science and are most frequently used in real world applications. These include the internal structures of integers, floating point numbers, characters and references; arrays of primitive types, inserting and deleting; of composite types (C-structs, Python lists), parallel arrays, 2-dimensional arrays; arrays for storing pointers to more complex structures, arrays of linear lists (e.g. for graphs and hash

tables). Also explained are various uses of arrays for example as containers, queues, stacks, circular buffers.

It also explains linked structures like linked lists, their traversal, insertion and deletion; trees like binary search trees, their traversal, search, insertion and deletion; balancing methods e.g. AVL, red-black, splay. The B-tree for fast access on hard drives. Some heap techniques are explained and some structures for working on graphs (e.g adjacency list and matrix).

The used programming language is suggested to be Python, and is determined by the instructor (for example: C++, Java).

### **CSC 490 SENIOR PROJECT (3)**

This course can be taken only in the 5th trimester of the program or later.

The Senior Project is a capstone experience: the summative component of the Bachelor's degree program in Computer Science. It consists of a project, application, or computer program, submitted by a student or group of students at the end of their program and should demonstrate the learned discipline, skills and academic thinking of the student(s). It is meant to integrate theory and practical application. It should be an analysis of some problem into knowledge components and their synthesis into a new coherent whole. Its purpose is to allow assessment of the students' learning, discipline and qualification to be awarded the Bachelor's degree. The senior project's topic usually is proposed by the student or students and must be approved by the faculty who supervises the project. It must be completed by the student(s) under faculty supervision either alone or within a very small team (up to 3 students).

## **FACULTY**

**-Cornel Pokorny, PhD** Technical Sciences, Technical University Vienna, Department Chair

## **CORE FACULTY**

**-Richard Sun, PhD** Computer Science, University of Illinois

## **ADJUNCT FACULTY**

**-Qamar Asghar, MS** Mechanical Engineering, University of Tennessee

**-Mar Castro, MS** Software Engineering, Cal State Fullerton

**-Tushar Chandra, MSCS & Engineering**, Arizona State University

**-Arijit Das, MS** Computer Science, Oregon State University

**-Patricia Hoffman, PhD** Applied Mathematics, UC Santa Cruz

**-Dongming Liang, PhD** Computer Science, York University

**-Dick Liu, PhD** EE Computer Systems Laboratory, Stanford University, MS Computer Science, Pennsylvania State University

**-Srinivasan Mandyam, PhD** Computer Science, Indian Institute of Science

**-Tony Nguyen, MS** Computer Science, Santa Clara University

**-Da-Qi Ren, PhD** Computer Engineering, Concordia University Montreal

**-Richard Riehle, PhD** Software Engineering, Naval Postgraduate School

**-Zhupei Shi, PhD** Physics, New York University

**-Jeremy Tzeng, PhD** EECS, UC Berkeley

**-Alex Wu, PhD** Mechanical Engineering, UC San Diego

**-Yurong Xu, PhD** Computer Science, Dartmouth College

**-Victor Yu, MA** Geographical Information System, University of Akron, BS Computer Science, Franklin University

**-Ming Hwa Wang, PhD** Computer Science, Illinois Institute of Technology

**-Fang Yuan, PhD** Applied Statistics, University of Alabama

## DEPARTMENT OF DIGITAL ARTS

### MISSION

The pace of technology, innovation and creativity is constantly on the rise, demanding new methods of learning and curriculum. The ITU Digital Arts Department strives to fulfill this demand by being open and proactive in integrating the latest technologies and ideas with the most timeless fundamentals of art and science. We encourage and engage in regular dialogue among our faculty, students and industry leaders to ensure our program is industry relevant and nurtures the world's most creative innovators and leaders in the field of digital arts.

### INSTITUTIONAL LEARNING OUTCOMES (ILOS)

1. Problem Solving: Construct, interpret, analyze, and evaluate information and ideas derived from a multitude of sources in order to reach reasoned solutions or alternative strategies to solve problems.
2. Critical Thinking: Analyze facts and information from multiple sources in order to assess the relevance and synthesize that information in order to formulate meaningful arguments and conclusions.
3. Communication: Interact clearly and effectively in written and oral forms with personal and professional constituencies.
4. Team Work: Operate collaboratively and respectfully as members and leaders of diverse teams and organizations.
5. Technical Literacy: Work responsibly, appropriately and effectively, using technology tools to access, manage, integrate, evaluate, create and communicate information and innovation.
6. Research: Identify and implement systematic methodologies for discovering, understanding, analyzing and interpreting materials, information and behaviors.
7. Responsibility: Practice sound, ethical, and social responsibility in professional and personal endeavors and decision-making.

**Master Of Science In Digital Arts** In a world of smartphones, tablets, wearable devices, and Virtual Reality (VR) and Augmented Reality (AR), the role of a digital artist is more important than ever. Not only is there an insatiable appetite for new content, but also the skills demanded from a designer, storyteller, and artist to create that content has extended far beyond traditional skill-sets. An infinite number of opportunities await those with the proper abilities and imagination.

ITU's Digital Arts (DA) program is taught by experienced industry professionals who integrate design fundamentals, content creation expertise, and entrepreneurial innovation into a unique program tailored to the modern artist who dares to innovate and create their own vision of the future. Students will learn to produce live action and interactive and augmented media. The program prepares students to become leaders in digital design, marketing, production, advertising, filmmaking, gaming, AR, VR, mobile, and app industries. Graduates of this program will build multimedia portfolios with a thesis designed for peer-reviewed publications in academic and industrial journals. The Digital Arts program requires successful completion of 39 credit hours. The program offers concentrations in different disciplines. Concentration courses and elective ones provide flexibility in customizing the program to meet professional and personal goals.

### PROGRAM LEARNING OUTCOMES (PLOS)

All PLOs are mapped to the relevant ILOs and contained within parentheses. Upon completion of this program, graduates will:

- » PLO #1: Apply foundational digital production skills to create stories, visualizations and designs. (Mapped to ILO #1: Problem Solving.)
- » PLO #2: Create professional grade digital productions by utilizing general production pipelines from conception to production, marketing and distribution. (Mapped to ILO #5: Technical Literacy.)
- » PLO #3: Analyze products and situations to effectively articulate and identify opportunities for innovation and experimentation in art, design and product development. (Mapped to ILO #3: Communication literacy and ILO #2: Critical Thinking.)
- » PLO #4: Apply collaborative skills and evaluate team dynamics to successfully complete team-oriented master digital art projects. (Mapped to ILO #4: Collaboration and Teamwork.)
- » PLO #5: Apply understanding of software, hardware and the production process to identify appropriate industry standards to complete digital productions. (Mapped to ILO #5: Technical Literacy and ILO #6: Research Skills and Information Literacy.)

- » PLO #6: Create a portfolio of projects that showcase multiple art and media skills in design, animation, filmmaking and interactive design. (Mapped to ILO #7: Individual Responsibility and ILO #5: Technical Literacy.)

## CAREER OPPORTUNITIES

ITU's Digital Arts program can prepare a student for a career in Design, Digital Marketing, Production, Interactive Media, UI/UX, Computer Graphics and Visual Effects (VFX), Film, Video Games, 3D Modeling and 3D Printing, Animation, Podcasting, Photography, Augmented Reality, and Virtual Reality.

## MASTER OF DIGITAL ARTS PROGRAM REQUIREMENTS

### REQUIRED COURSES:

- » 3 Core Courses (9 credit hours)
- » Capstone course - Project or Thesis (3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
- ITU Presents (1 credit hour)
- ITU Nuggets (2 credit hours)

### ELECTIVE COURSES:

- » With approval from the DGA Department any course from
  - Department of Business Administration
  - Department of Computer Science
  - Department of Engineering Management
  - Department of Electrical and Computer Engineering
- » Internship: 1-8 credit hours
- » Transfer Credits: Up to 9 credit hours from a graduate program of a regionally accredited school with department chair's approval.

39 total credit hours

### GRADE POINT AVERAGE (GPA)

A minimum 3.0 cumulative GPA is required for granting of the Master's and Doctoral degree.

### REQUIRED CORE COURSES

- » DGA 501 New Media Production
- » DGA 621 Producing Digital Media
- » DGA 631 Digital Media Startup

### REQUIRED CAPSTONE COURSE

- » DGA 690 Master's Project

OR

- » DGA 692 Master's Thesis

### INTERNSHIP

- » INT 593 Internship

### ITU PRESENTS

- » PRE-500 ITU Presents (1/3)

\*Students must take three ITU Presents courses for a total of 1 credit hour.

### ITU NUGGET COURSES

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

## MASTER OF DIGITAL ARTS CONCENTRATIONS

### » UI/UX

- » Production
- » Digital Marketing
- » Game Design and Development
- » Interactive Media and Games
- » Mobile Design and Development
- » Global Entertainment Management

### GRADE POINT AVERAGE (GPA):

If students complete with a passing grade in the Digital Arts program concentration, they will be eligible to graduate with a Digital Arts degree in their selected concentration (e.g. Digital Arts in Production, etc.). The project or thesis topic should be on the selected concentration. If a student has declared a concentration and does not complete the required concentration courses by graduation, the student will graduate with a Digital Arts degree, with no concentration. Please note that concentrations will only appear on the transcript, and not on the diploma.

### DECLARING OR CHANGING A CONCENTRATION

#### (FOR DIGITAL ARTS PROGRAM ONLY)

Digital Arts program concentrations may be declared starting at the point of admissions. If a student does not declare a concentration during the admissions process, the student will be enrolled in the Digital Arts program. Students may add or

change their Digital Arts program concentration at any point before the completion of 19 credit hours. Any approved transfer credit will be counted towards the 19 credit hours. Requests to declare or change concentrations must be made by the first day of the trimester in which the student will attempt the 20th credit hour in order to be considered. The department chair must approve any exceptions to the conditions above.

## **REQUIRED COURSES FOR EACH CONCENTRATION**

**UI/UX CONCENTRATION (9 credit hours)** Students must take DGA 518 UI/UX: User Interface and User Experience and DGA 528 Dynamic UX and one (1) of the following courses:

DGA 507 Design Fundamentals  
DGA 509 Basic Image Manipulation  
DGA 512 Web Graphic Design  
DGA 520 Motion Graphics  
DGA 503 Storyboard Design

## **DIGITAL MARKETING CONCENTRATION (6 CREDIT HOURS)**

Students must take DGA 523 Social Network Marketing and Publishing and one (1) of the following courses:

MKT 585 International Marketing  
MKT 590 Marketing with Social Media  
MKT 551 Competitive Marketing Strategies

## **PRODUCTION CONCENTRATION (9 CREDIT HOURS)**

Students must take three of the following courses:

DGA 526 Screenwriting  
DGA 527 Production  
DGA 522 Editing I  
DGA 520 Motion Graphics  
DGA 503 Storyboard Design

## **INTERACTIVE MEDIA AND GAMES CONCENTRATION (9 CREDIT HOURS)**

Students must take DGA 508 CG Software Fundamentals and an additional two (2) of the following courses:

DGA 524 Virtual Reality/Augmented Reality  
DGA 529 Introduction to Games programming Unity, SpriteKit using C#, and Swift  
DGA 661 Unity 2D/3D Game Development Platform  
DGA 510 Intro to Game Development  
DGA 609 3D Modeling and 3D Printing  
DGA 520 Motion Graphics

## **MOBILE DESIGN AND DEVELOPMENT, GAME DESIGN AND DEVELOPMENT AND GLOBAL ENTERTAINMENT MANAGEMENT**

concentrations require Digital Arts Department Chair approval for concentration course require-

ments

## **ELECTIVE COURSES**

Electives from the MSDA curriculum must be chosen so that the total number of credit hours completed is at least 39

- » DGA 503 Storyboard Design
- » DGA 504 Global Storytelling
- » DGA 507 Design Fundamentals
- » DGA 508 CG Software Fundamentals
- » DGA 509 Basic Image Manipulation
- » DGA 510 Intro to Game Development
- » DGA 512 Web Graphic Design
- » DGA 513 Documentary Production
- » DGA 515 Sound Design
- » DGA 516 Production Sound Recording
- » DGA 517 Post Production Sound Recording
- » DGA 518 UI/UX: User Interfaces and User Experiences
- » DGA 519 Still Life and Figure Drawing
- » DGA 520 Motion Graphics
- » DGA 521 Digital Media Distribution
- » DGA 522 Editing I
- » DGA 523 Social Network Marketing and Publishing
- » DGA 524 Virtual Reality/Augmented Reality
- » DGA 526 Screenwriting
- » DGA 527 Production
- » DGA 528 Dynamic UX
- » DGA 529 Introduction to Games Programming Unity, SpriteKit using C#, and Swift
- » DGA 531 Beginning Augmented Reality
- » DGA 532 Beginning Virtual Reality
- » DGA 533 Artist Representation
- » DGA 534 Production Management
- » DGA 535 Business of Entertainment
  - » DGA 536 Originating and Development Ideas for Entertainment
- » DGA 606 Animation I
- » DGA 607 Storyboards and Layouts
- » DGA 608 CG Modeling
- » DGA 609 3D Modeling and 3D Printing
- » DGA 610 Rigging for 3D Animation
- » DGA 611 Lighting and Compositing
- » DGA 612 Concept Art and Storyboarding
- » DGA 615 Zbrush
- » DGA 617 Motion Capture
- » DGA 622 Editing II
- » DGA 626 Animation II
- » DGA 641 Augmented Reality Design and Production
- » DGA 642 Virtual Reality Design and Production
- » DGA 661 Unity 2D/3D Game Development Platform
- » DGA 688 Special Topics (1 to 3 credit hours)
- » DGA 689 Independent Study (1 to 3 credit hours)
- » MKT 551 Competitive Marketing Strategies
- » MKT 585 International Marketing
- » MKT 590 Marketing with Social Media
- » CSC 515 iPhone Application Development
- » CSC 518 OO Programming with Java

- » CSC 519 Android Phone Application Development
- » CSC 520 Python Programming
- » CSC 525 HTML/CSS Programming
- » CSC 530 JavaScript Programming
- » SWE 518 User Interface Design and Implementation

#### **INTERNSHIP**

- » INT 593 Part-time/Full-time Internship (1/3-3 credit hours)

## COURSE DESCRIPTIONS

### DIGITAL ARTS (DGA)

#### **DGA 501 NEW MEDIA PRODUCTION (3)**

Prerequisites: None

Students will be introduced to new media production and its historical contexts. This course presents principles of production that can be applied to long-established, current and developing media outlets. Students will look at where media has been, where it is now, and where it is going - media for entertainment, media for corporate, and media for social, personal uses. Students will engage in new media production with hands-on experience in creating their own projects. Students will be brought up-to-date with the major players in these media outlets. Each member of the class will be critiquing established media and follow the development of new content. The class covers basic principles of story and production as they relate to print, web, mobile and video. Students will experience the production pipeline of concept of creation, development, preproduction, production, post production and distribution. Students will gain vital skills in scheduling, budgeting, creating and working within deadlines, operating in a team-based environment.

#### **DGA 503 STORYBOARD DESIGN (3)**

Prerequisites: None

Today, Storyboard use is not exclusive to the narrative forms of Film and Animation, but is also widely used in the design of Video Games, Interactive GUI's, Product Presentations and more. Using stories, designs and flowcharts from actual productions, this course will show students of any drawing skill level an overview of how to effectively design and construct storyboards from thumbnails to presentation layouts.

#### **DGA 504 GLOBAL STORYTELLING (3)**

Prerequisites: None

In a world where the noise of mass and personal communications can overwhelm any message and idea, the role of storytellers who can tell inspiring, persuasive stories and is more important than ever. This course will demonstrate how to apply the universal heroes' journey in a way that transcends global cultures and civilizations.

Students will explore the universal communication tool known as "stories" from its traditional forms such as fairytales, folklore and mythology through today's digital, augmented transmedia as a means of entertainment, education and communication.

#### **DGA 507 DESIGN FUNDAMENTALS (3)**

Prerequisites: None

This course blends classical visual language fundamentals with project-based design learning applica-

ble to the media and tech industries.

Students will learn how to apply core principles of typography, color, and composition to digital products. The emphasis of the course on design 98 methodologies in both theory and practice are instrumental in improving design performance, problem solving skills, and making students into better designers. Course projects will enable students to build a portfolio of digital design solutions across mobile, web, games or film.

#### **DGA 508 CG SOFTWARE FUNDAMENTALS (3)**

Prerequisites: None

This course will provide an overview of the computer graphics process utilized today in print, commercials, games, television and movies. The course will offer the student a hands-on tutorial covering modeling, rendering, lighting, animation and compositing. Students will get to construct a 3D model and take it through all phases of the computer graphic process culminating in a finished scene realistically composited into a 2D background. Other subjects covered include principles of rigging, animation, motion tracking and camera moves with examples provided. Lab fees may apply.

#### **DGA 509 BASIC IMAGE MANIPULATION (3)**

Prerequisites: None

In this modern digital age, the basic principles of photography have not changed. But the tools and techniques of how we arrive at our final image continue to evolve. This class will introduce students to the principles of photography and then explore the tools and aesthetics employed by professionals and amateurs alike to alter or enhance their images. Techniques and skills acquired will then be applied to projects. This class will require a laptop or tablet that can handle the specifications of the software Adobe Photoshop.

#### **DGA 510 INTRO TO GAME DEVELOPMENT (3)**

Prerequisites: None

What are the different elements to a game? What makes a great game? Computer game development requires all facets of Computer Science, including Computer Graphics, Artificial Intelligence, Algorithms, Data Structures, Networking, and Human-Computer Interaction. It also requires knowledge of other disciplines including Economics, Mathematics, Physics, and Psychology. The value of this course goes beyond culminating Computer Science. It is largely a hands-on course where real-world skills including design, teamwork, management, documentation, and communications are critical. This course will delve into topics such as the game engine, rendering, user interfaces, sound, animation, and game hacking. This course will also cover designing MMORPGs and mobile games.

## **DGA 511 GENERAL PRODUCTION PIPELINES**

**(3)**

Prerequisites: None

This course covers the general procedures and methodologies to produce a production pipeline from start to finish. One will be lead through the production process breaking down each phase in a step-by-step fashion and will be introduced to easily applied principles of scheduling each task. Students will learn to apply these principles to breakdown and schedule in either real-time rendering projects — such as a video game or image rendered projects— from animated shorts to features.

## **DGA 512 WEB GRAPHIC DESIGN (3)**

Prerequisites: None

This course provides students with instruction in graphic editing software. Projects will use tools, layers and filters to design, edit and create digital images for the Web, apps and digital and interactive media. Topics covered will include: Basic Web design tenets, Using color effectively, Understanding fonts, Designing navigation, Creating graphics that don't distract from your site, and Using multimedia (sound, animation, and other media) on your site.

## **DGA 513 DOCUMENTARY PRODUCTION (3)**

Prerequisites: None

This course is designed to introduce students to a complete beginning-to-end production process, with the goal of creating a class documentary project. Students will learn every step required to produce and create a finished film, including preproduction planning, camera operation and shooting, lighting, interview techniques, storytelling strategies, editing, motion graphics, and more. An understanding of these tools and procedures are essential for any student who wishes to work in film, or who desires to produce compelling narrative content in a variety of media.

## **DGA 515 SOUND DESIGN (3)**

Prerequisites: None

This course provides an introduction to sound design principles for multimedia in a broad and diverse manner. Students will develop skills in recording, digital editing and mixing with industry standard software and techniques.

## **DGA 516 PRODUCTION SOUND RECORDING**

**(3)**

Prerequisites: None

This course is designed to acquaint and introduce students to the basic principles of audio recording and production through classroom lecture, and hands on training, as well as guided and individual studio projects. Students will learn recording techniques, including the choice of microphones and their placement, as well as mixing multi-track audio

utilizing equalization, compression, reverb, and panning, with an emphasis on acoustics and the physics of sound. Class projects will focus on recording audio for distribution within, TV, radio, computer gaming, and film. Students will attend lectures and gain experience in production as they complete the projects assigned in the course.

## **DGA 517 POST PRODUCTION SOUND RECORDING (3)**

Prerequisites: None

This course will teach students the specific techniques and strategies used during the audio post-production process. Students will learn how to spot, edit, and assemble dialogue, sound effects, Foley, and music, in addition to mixing and prepping the audio using the industry standard, Pro Tools and other DAW technologies. The course begins with a real-world overview of audio post production, including its evolution, methods, sound crew, and media formats. It then explores techniques and tips for recording location sound, using sound effects libraries, editing production dialogue, and directing and recording a Foley session. Students will learn strategies for working with composers and music supervisors, how to edit songs to fit a scene, and how to record and mix score music. In addition, students will learn how to assemble a predub or temp mix (to group and sub-mix tracks into stems for the final dub), create the final dub, and prepare the mix for foreign distribution and final delivery.

## **DGA 518 UI/UX: USER INTERFACES AND USER EXPERIENCES (3)**

Prerequisites: None

This course offers students an engaging introduction and hands-on practice in the fundamental areas of human centered user experience (UX) design. This course will explore design-thinking strategies ranging from behavioral psychology basics to techniques for user research, design ideation, rapid prototyping and usability evaluations. Students will learn how to gather and translate user needs into clear and responsive user interface (UI) solutions. Students will demonstrate their creative problem solving skills by building a design portfolio across a range of UX / UI projects throughout the course.

## **DGA 519 STILL LIFE AND FIGURE DRAWING (3)**

Prerequisites: None

Digital Art calls on a variety of disciplines beyond proficiency with particular software. There are basic skills and techniques that bring creative ideas to strong, visual presentation. Still-life and Figure drawing are foundations on which most visual expression is built. In a series of sessions using both the Human Figure and Inanimate Objects, learn drawing techniques to capture form, light and shadow, perspective and composition.

## **DGA 520 MOTION GRAPHICS (3)**

Prerequisites: None

This course will explore the fundamental principles of motion graphics, which blend art and technology to create dynamic visuals for the screen. Students will become familiar with the processes of creating effective animated graphics, suitable for broadcast, films, titles, or commercials. One will learn to create engaging visual imagery, generate unique ideas, and to apply color palettes that support a concept. This course will teach students advanced techniques of motion-graphics creation through the use of software programs utilized by design and animation companies worldwide.

## **DGA 521 DIGITAL MEDIA DISTRIBUTION (3)**

Prerequisites: None

The business of media is distribution. It is the art and method of maximizing profits in the delivery and consumption of your work. But the business model and methods of media distribution now change and evolve at ever increasing rates. This course will expose students to industry concepts of networks, life-cycles, ultimates and windows, as well as how those concepts apply to new media such as VOD, apps, tablets, clouds and beyond. Upon completion, students will have an understanding of media business model fundamentals and be prepared to position themselves at the vanguard of the rapidly changing world of digital media distribution.

## **DGA 522 EDITING I (3)**

Prerequisites: None

This course offers students an in-depth understanding of editing principles is one of the core competencies of cinematic storytelling for movies, television, video games, advertising, animation and new media. Logical, intelligent editing is essential for clearly communicating story information and making video greater than the sum of its parts. The theory, practice, history, and techniques of editing will be covered in this comprehensive overview. Students will explore the art and function of editing the moving image for narrative, documentary, and non-traditional web material through an introduction to industry leading non-linear editing systems.

## **DGA 523 SOCIAL NETWORK MARKETING AND PUBLISHING (3)**

Prerequisites: None

In the vast sea of opportunities offered by today's technology and networks, how can you most effectively use social media to achieve your career goals? Many traditional forms of media and networking are simply not enough to reach and captivate today's media savvy audience. To successfully reach your online and offline audiences you must fully utilize creative, problem solving, design and communica-

tion skills. This class will explore established concepts of personal narrowcasting, blogs and tweets as well as modern takes on subjects such as data visualization and vanity metrics vs. validated learning. Finally, all of these concepts and skills will be applied utilizing affordable and accessible digital publishing tools to deliver the latest apps and media.

## **DGA 524 VIRTUAL REALITY/AUGMENTED REALITY (3)**

Prerequisites: None

This course focuses on the design and evaluation of Augmented Reality (AR) and Virtual Reality (VR) systems, algorithms, and applications related to the hardware, software, interaction, psychology, technology, and research that are used. Class topics will include systems for presenting information to all five senses (visual, auditory, haptic, olfactory and gustatory), methods for users to interact with objects within virtual environments, and evaluation techniques for assessing effectiveness, as well as vision-based marker and feature tracking, model-to-view space transformations, mobile application development, and interaction techniques. Students will interact with various display and interface 100 devices throughout this course, develop prototype applications, and evaluate them. Through a combination of traditional lecture, literature review, and hands-on work, students will learn to critically evaluate different alternatives, build prototype systems, and design comparative evaluations to test the effectiveness of various (AR) and (VR) applications.

## **DGA 526 SCREENWRITING (3)**

Prerequisites: None

Screenwriting is the foundation of cinematic storytelling, and is also a primary tool for animation and video game development. This class will teach students the fundamentals of compelling plots and great drama, the nuances of realistic character development, tips and tricks for writing visually compelling scenes, and how to make your dialog jump off the page. Through story analysis and writing exercises, students will learn to take apart any story to see what makes it work, and will author their own short screenplays all the way from idea to finished script.

## **DGA 527 PRODUCTION (3)**

Prerequisites: None

This course is designed to introduce students to a complete beginning-to-end production process, with the goal of creating a class project. Students will learn every step required to produce and create a finished film, including pre-production planning, camera operation and shooting, lighting, interview techniques, storytelling strategies, editing, motion graphics, and more. An understanding of these tools and procedures are essential for any student who

wishes to work in film, or who desires to produce compelling narrative content in a variety of media.

### **DGA 528 DYNAMIC UX (3)**

Prerequisites: None

This course will explore how web technologies are making it easier for websites to become more interactive and behave more like native applications. Students will learn to identify and improve static web designs through the use of dynamic web content, make web pages more interactive without sacrificing usability or accessibility, learn how to deal with touch-screen devices, and learn to give on-screen feedback effectively This course is intended for • UX, UI and Web designers – both beginners and advanced • Marketers • Developers

### **DGA 529 INTRODUCTION TO GAMES PROGRAMMING UNITY, SPRITEKIT USING C#, AND SWIFT (3)**

Prerequisites: None

Learn to code in Swift Apple's new coding language. Learn to make apps in Xcode and learn how to make games with SpriteKit. The course is step by step and project-based, so you will learn programming Swift and C# concepts and apply them immediately to real indie games as you go. • Build an entire game yourself • Step by step in class • Learn Swift and C# • Learn Sprite kit and Unity Requirements: Students must have knowledge of programming in Java, C, C++ or equivalent, course might requires a MAC computer for the Swift and SpriteKit loaded with latest version of Xcode.

### **DGA 531 BEGINNING AUGMENTED REALITY (3)**

Prerequisites: None

Augmented reality, virtual reality, mixed reality... these systems can provide users with astonishingly immersive content. What are the sciences involved in this new technology, and what are the content integration issues to building these virtual places? This course focuses on the design and evaluation of Augmented Reality (AR) systems, algorithms, and applications related to the hardware, software, interaction, psychology, algorithms, technology, and research that are involved. With the proliferation of powerful, always-on, Internet-connected mobile devices such as smart-phones, tablets and newer headworn displays, sophisticated applications that combine location-specific content with the current user view are becoming more possible. Application developers for these devices require a broad set of technical and design skills to create effective interactive AR experiences. Topics will include vision-based marker and feature tracking, model-to-view space transformations, mobile application development, and AR interaction techniques. Through a combination of traditional lecture, literature

review, and hands-on work, students will learn to critically evaluate different alternatives, build prototype systems, and design comparative evaluations to test the effectiveness of various AR applications. Students will be expected to implement several techniques as part of this course. This course welcomes students with a diverse set of backgrounds, including (but not restricted to): computer science, math, physics, digital art, engineering, architecture, and psychology.

### **DGA 532 BEGINNING VIRTUAL REALITY (3)**

Prerequisites: None

During this course, students will explore the techniques and technologies that need to be brought together to allow Virtual Reality, and other realities along the Mixed Reality Continuum and organic life forms to interact within virtual worlds. Commercial displays, trackers and graphics hardware have enabled many new applications and venues, including: entertainment, training and learning activities, exercise, assessment, rehabilitation and socialization. Class topics include systems for presenting information to all five senses (visual, auditory, haptic, olfactory and gustatory), methods for users to interact with objects within virtual environments, and evaluation techniques for assessing effectiveness. Students will interact with various display and interface devices throughout this course, develop prototype applications, and evaluate them. The format of the course will be a combination of traditional lecture, literature review, and hands-on work. Because the definition and purpose of Virtual Reality is in flux and evolving rapidly, this course will be colloquium in nature, focused on synthesizing existing literature from multiple related fields and sources, in order to understand and make use of these changes to VR.

### **DGA 606 ANIMATION I (3)**

Prerequisites: None

Students will develop an understanding of a wide variety of applications used in animation and learn the principles behind 2-D, 3-D, and motion graphics. Through an exploration of 2-D animation concepts, design and techniques, each student will become familiar with animation language and eventually garner the basics used for modeling, positioning and rendering 3-D objects using Autodesk Maya, one of the leading animation software packages for the film and gaming industries.

### **DGA 607 STORYBOARDS AND LAYOUTS (3)**

Prerequisites: DGA 503

In this course, students will learn advanced storyboarding and the layout process as it relates to the narrative structure. Emphasis is placed on the full storyboard process from initial sketch (thumbnails) to final, sequential panels. Using supplied stories, design and flow chart examples, students will learn to apply the essentials of drawing to a production,

from initial storyboard sequences to final production layouts. Through interactive lectures, discussions, demonstration and studio work, students will be able to translate narrative concepts into effective visual communications for film and video productions, animation, motion graphics, multimedia apps, video games, and theme park attractions.

### **DGA 608 CG MODELING (3)**

Prerequisites: DGA 508

3D modeling involves digitally constructing shapes in a virtual space and is utilized in fields ranging from movies, animations, video games, architecture, medical and industrial visualizations, and a host of new applications and media such as creating virtual actors and Augmented Reality (AR). In this course, students will learn the techniques used by movie and video game industry experts to create professional 3D Models. They will use industry techniques and applications to create new worlds by designing and modeling their own objects, creatures, and environments. This class requires a laptop computer or tablet running Adobe CC Photoshop.

### **DGA 609 3D MODELING AND 3D PRINTING (3)**

Prerequisites: DGA 508

This course instructs students in the best industry standard practices and production pipelines for creating 3D assets using Autodesk Maya, one of the leading software packages for the film and gaming industries. Students will explore the tools and techniques needed to model a wide array of characters, objects, architectures, and environments. Students will build a strong understanding of the methods and principles of 3D modeling. Aspects of the production pipeline will be covered, but the main focus will be from concept design to final sculpture. In addition to learning the basics of 3D modeling with Maya, we will be learning some basics of 3D printers, such as MakerBot Replicator 2. Students will learn the differences between printing materials, techniques to have more predictable results, limitations of current 3D printers and even will be able to print out some objects by the end of the class session!

### **DGA 610 RIGGING FOR 3D ANIMATION (3)**

Prerequisites: DGA 508

This course introduces the basic techniques of character set-up and rigging as used in 3D animation. This course will cover such principles and skills as how to set up a skeleton for an animated character, joint hierarchies, forward kinematics, inverse kinematics, constraints, and how to create facial rigs and blendshapes for facial animation.

### **DGA 611 LIGHTING AND COMPOSITING (3)**

Prerequisites: DGA 508

This course covers the art and science of lighting, shading, and compositing to create computer

graphics images (CGI). The lighting and shading portion of the course investigates the look, shading, and atmosphere techniques that brings characters and scenes to life. The compositing portion of the course focuses on the integration of CGI elements with live action footage. The course begins with introduction to the history of photographic lighting and compositing and ends with students learning to create and integrate their own CGI elements through both individual and team based projects.

### **DGA 612 CONCEPT ART AND STORYBOARDING (3)**

Prerequisites: DGA 503

A critical phase for cinema pre-production is in design, planning and storyboarding. Stories unfold through concept designs that include characters, props, wardrobe, locations, sets, color palettes, and environments. No matter what the size of their cinematic project, this course will get students ready for production and a unique integrated approach to quick, realistic and aesthetic designs relevant to their story and characters. Students will learn to generate preproduction material from concept illustrations and character designs to color studies, storyboards and wardrobe designs.

### **DGA 615 ZBRUSH (3)**

Prerequisites: DGA 608

ZBrush is a very powerful 3D sculpting and texturing tool. The course covers the most popular tools and techniques for digital painting and sculpting in ZBrush, and explains how to export the models and texture maps to other programs for use in games, film, fine art, or 3D printing. The course also highlights the new features in ZBrush 4, such as ShadowBox, clip brushes, and LightBox. Exercise files are included with the course. Topics include: navigating the canvas, using perspective and floor, creating a mesh with a ZSketch, extracting from an existing mesh, managing subdivision levels, working with alphas, masking off parts of a model, using deformation, using subtools, deforming with Transpose, painting and texturing, and creating UV maps. Software used: ZBrush and/or Photoshop.

### **DGA 617 MOTION CAPTURE (3)**

Prerequisites: DGA 610

Motion capture, often called mocap, is the process of digitizing a performance from an actor or animal. It is commonly used for reference or a method to get animation data quickly. This course will cover topics such as: skeletal rigs, animation retargeting, data cleanup, and on set preparation.

Software used: Maya and/or Motion Builder.

### **DGA 621 PRODUCING DIGITAL MEDIA (3)**

Prerequisites: None

The skills necessary to produce today's media are more demanding than ever. Whether it is mov-

ies, games, motion graphics, interactive apps and other new media, this class will help students apply universal business production processes essential to take a media project from concept to completion. Topics covered in this course include concept and story development, pre-visualization, bidding, budgeting, financing, scheduling, talent and asset management, and distribution.

### **DGA 622 EDITING II (3)**

Prerequisite: DGA 522

The techniques learned in Editing 1 are now applied to the creation of short videos. Students will write and plan short narratives, shoot these projects with basic video cameras, then assemble their work using editing software. The class will cover the technical foundations of nonlinear editing and its software, and provide an introduction to image adjustment tools such as digital mattes, color correction, time remapping (slow and fast motion), title generators, and motion graphics. Video compression and codecs will also be covered.

### **DGA 626 ANIMATION II (3)**

Prerequisites: DGA 606

Using principles introduced in DGA 606 Animation 1, this class offers more advanced and detailed explorations into animation concepts, techniques and processes including acting, gesture, storytelling, 2-D and 3-D forms, software proficiency and project management from concept through to completion of an animated project. This will lead to final projects where students will work individually and with others to complete an animated project which be included in one's student showreel.

### **DGA 631 DIGITAL MEDIA STARTUP (3)**

Prerequisites: None

The state of innovation sets the tone, direction and growth of jobs and entire new industries. The heart of new and innovative ideas is the modern start-up. Master the creative, technical and business skills required to conceive and create one's own disruptive idea, then launch it into a new startup. This is project-driven and can be a companion class to the Digital Arts Master Project where students conceive and produce a project from their own original ideas and designs.

### **DGA 641 AUGMENTED REALITY DESIGN AND PRODUCTION (3)**

Prerequisites: DGA 524 and DGA 508 A Journeyman Level course that gives students an opportunity to learn about Mixed Reality and a specific subclass referred to as Augmented Reality as a technology, a human computer interaction paradigm, and an electronic medium. Today's powerful, always on, Internet-connected mobile devices, wearables and newer head-worn displays, require sophisticated applications and content that combine location specific

information with the current user view. Application developers for these devices require a broad set of technical and design skills to create these effective interactive AR experiences. Students will work individually and in teams to explore the potential of AR. Students with backgrounds in visual design, industrial design, architecture, video production, and visual storytelling are welcome, as are students with significant programming, HCI or computer graphics backgrounds.. Through a combination of traditional lecture, literature review, and hands on work, students will learn to critically evaluate different alternatives, build prototype systems, and design comparative evaluations to test the effectiveness of various AR applications. Students will be expected to implement several techniques as part of this course.

### **DGA 642 VIRTUAL REALITY DESIGN AND PRODUCTION (3)**

Prerequisites: DGA 508 and DGA 524

Virtual Reality Design and Production is a Journeyman Level course designed to instruct students the fundamentals of Virtual Reality content design and production. Course content will focus on digital story development, methodology, technical skills and the software proficiency necessary to create deeply immersive, multisensory, interactive experiences. Through a combination of lectures, class discussion, hands on experience, in depth topic presentations, and readings from current industry relevant literature, students will be exposed to a wide range of interesting and exciting research in the broadly defined field of virtual reality, 3D user interaction and spatial user interfaces. Students will have the opportunity to conduct a semester-long term project, working hands on with leading edge virtual reality hardware such as the Oculus Rift virtual reality headset, the Oculus /Samsung Gear VR wireless headset, Google Cardboard phone based viewers, and the HTC Vive.

### **DGA 661 UNITY 2D/3D GAME DEVELOPMENT PLATFORM (3)**

Prerequisites: DGA 508

Many of today's games were created using a game engine, such as Crytek, Unreal Engine, Unity or even a proprietary one written in house. These game engines provide many built in functionalities that aid in the game making process. This course will teach you how to make games from your own assets (3D models, textures, and character rigs).

Student will also be writing their own C# scripts.

Software: Maya, Photoshop and Unity.

### **DGA 688 SPECIAL TOPICS (1-3)**

Prerequisites: None

Special topics courses cover subjects not currently contained in the curriculum, but are designed to address especially relevant trends or developments

related to the discipline.

### **DGA 689 INDEPENDENT STUDY (1-3)**

Prerequisites: None

Independent Study allows students to explore academic areas of special interest not provided in the existing curriculum. It is carried out under the guidance of a member of the faculty.

### **DGA 690 MASTER'S PROJECT I (3)**

Prerequisites: Approval from a faculty advisor This is a capstone project culminating in applying and demonstrating the knowledge base and skills acquired throughout the MSDA program and meeting all departmental Program Learning Outcomes. One is eligible for Master's Projects only within the final two semesters prior to graduation. One will need to get approval and work closely with a faculty advisor to map out a study plan and create Student Learning Outcomes for a Master's Project before enrolling in this capstone program.

### **DGA 692 MASTER'S THESIS (3)**

Prerequisites: Department Chair's approval and completion of 27 credit hours of the MSDA program. The master's thesis must be arranged with the master's thesis advisor. After the topic is approved independent research in Digital Arts toward the MS degree must be conducted. The research must result in some new insights into the academic or practical concepts of the Digital Arts world. These must be analyzed, explained, and documented in the thesis. After completing the thesis the student must defend it before a committee of faculty appointed by the Department Chair.

### **INTERNSHIP (INT)**

#### **INT 593 PART-TIME/FULL-TIME**

#### **INTERNSHIP (1/3- 3)**

Prerequisites: None

This course consists of participation in a full-time or part-time internship experience, related to the student's field of study under the supervision of both an approved internship provider and a faculty advisor. This course provides practical, hands-on training in a relevant industry to enhance classroom learning. A maximum of 10 credit hours earned in INT 593 may be applied toward the Master's Degree graduation requirements.

### **NUGGETS - IDS (INTERDISCIPLINARY SCIENCES)**

#### **IDS 550 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 551 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 552 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 553 ITU NUGGETS (CONSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

#### **IDS 554 ITU NUGGETS (CONSILIENCE "UNITY**

### **OF KNOWLEDGE” CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

### **IDS 555 ITU NUGGETS (CONSILIENCE “UNITY**

### **OF KNOWLEDGE” CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

### **PRE-500 ITU PRESENTS (1/3)**

Prerequisites: None

ITU Presents, formerly “Joint Seminar,” was created and first taught by ITU’s Founder, Professor Shu-Park Chan, who invited guest speakers, typically Silicon Valley industry leaders, to speak on topics of their personal interest followed by a Q&A session with ITU students. Historically, ITU Presents remained the favorite and reportedly “most useful” class of ITU alumni, as it gave ITU students the ability to listen to the real-life experiences of famous technologists who often shared their early career struggles, strategies, and successes with students.

## **FACULTY**

**-Jake Wachtel, MS**, USC Annenberg School for Communication and Journalism, Digital Social Media, Award-winning Producer and Journalist, Department Chair

## **CORE FACULTY**

**-Dave Lo, BFA**, Academy of Art University, Computer Arts, BS, Georgia Institute of Technology, Computer Science, Motion Picture Computer Artist

## **ADJUNCT FACULTY**

**-Stefan Al, PhD**, UC Berkeley, City and Regional Planning, MA, University College London and Delft University of Technology, Architecture; Award-winning Architect, Urban Designer, Author and Educator.

**-Jonali Bhattacharyya, MFA**, Academy of Art University, Animation and Visual Effects; Digital Art professional, Game Animator and award-winning Educator & Creative Director

**-Stacey Houghton, MFA**, Rochester Institute of Technology, Computer Graphics Design, Graphic Artist, UI/UX Designer, Web Designer

**-Gokce Kasikci, MFA**, San Diego State University, Multi-media, Art Director, Computer Graphics Design, Graphic Artist, UI/UX Designer, Web Designer

**-Chris Petrocchi, BS**, San Jose State University, Animator, Concept Artist and Art Director in television, games and film

**-Tom Rubalcava**, Designer, Director, Animator and Storyboard Artist in film, television, and commercials

**-Koji Steven Sakai**, Masters, Professional Writing, USC, Screenwriter, Producer, Novelist and Journalist

**-Shanan L. Sabin, MBA**, USC Marshall School of Business, Marketing, Award-winning Marketing Leader, Expertise in Integrated Campaigns, Global Market and Brand Strategy

**-Michael Snyder**, Journalist, Editor, Broadcaster, Educator, Screenwriter, and Animation Developer

**-Katherine Sweetman, MFA**, USC School of Cinematic Arts, Film and TV Production, MFA, UCSD, Visual and Performing Arts, Award-winning Content Creator

**-Allen White**, Filmmaker, Screenwriter, and Film Journalist

## **DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING**

The Department of Electrical and Computer Engineering at ITU was established in 1994. ITU's founder, Dr. Shu-Park Chan, was also the ECE Department's first Chair.

The ECE Department offers Doctor of Philosophy in Electrical Engineering (PhD-EE), Master of Science in Computer Engineering (MSCE), Master of Science in Electrical Engineering (MSEE), and Master of Science in Electrical and Computer Engineering (MSECE).

The ECE Department has introduced a new AI concentration that is available to all EE, CE, CS, SWE and ICS majors. The AI concentration is also available as a Minor for all students at ITU including Business, Engineering Management, and Digital Arts.

### **MISSION**

The Department of Electrical and Computer Engineering strives to prepare its graduates for success in professional careers, combining the rigor of science, the power of engineering and the thrill of innovation.

#### **Institutional Learning Outcomes (ILOs)**

1. **Problem Solving:** Construct, interpret, analyze, and evaluate information and ideas derived from a multitude of sources in order to reach reasoned solutions or alternative strategies to solve problems.

2. **Critical Thinking:** Analyze facts and information from multiple sources, in order to assess its relevance, synthesize that information and formulate meaningful arguments and conclusions.

3. **Communication:** Interact clearly and effectively in written and oral forms, with both personal and professional constituencies.

4. **Team Work:** Operate collaboratively and respectfully as members and leaders of diverse teams and organizations.

5. **Technical Literacy:** Work responsibly, appropriately and effectively, using technology to access, manage, integrate, evaluate, create and communicate information and innovation.

6. **Research:** Identify and implement systematic methodologies for discovering, understanding, analyzing and interpreting materials, information and behaviors.

7. **Responsibility:** Practice sound,

ethical, and social responsibility in professional and personal endeavors and decision-making.

The curriculum general requirements for ECE degrees (MS in Computer Engineering, MS in Electrical Engineering, and MS in Electrical and Computer Engineering):

- » 3 core courses (9 credit hours)
- » 5 Elective courses (15 credit hours)
- » Internship (up to 9 credit hours)
- » Capstone/Thesis (3 credit hours)
- » ITU presents (1 credit hour)
- » Nugget courses (2 credit hours)

Total credit hours 39

## **MASTER OF SCIENCE IN COMPUTER ENGINEERING**

The MSCE Program emphasizes system design, architectures, algorithms, and the development and application of intelligent systems. The MSCE program prepares students for professional careers in industry, research or education.

#### **Program Learning Outcomes (PLO)**

The Program Learning Outcomes (PLO) define the educational outcomes of the MSCE degree program:

- » PLO 1: Fundamentals: (ILO 5)
- » Outline up-to-date technologies in computer engineering
- » PLO 2: Engineering Ability: (ILO 1)
- » Demonstrate an understanding of established and emerging engineering techniques, and problem-solving skills
- » PLO 3: Research Ability: (ILO 6)
- » Solve problems in engineering through self-learning and research activities
- » PLO 4: Career Responsibility: (ILO 7)
- » Apply professional ethics in the definition, planning, and execution of engineering projects
- » PLO 5: Critical Thinking: (ILO 2)
- » Analyze engineering challenges to make evidence-based choices among various paradigms
- » PLO 6: Communication Skills: (ILO 3)
- » Present technical issues clearly and professionally in both oral and written communications
- » PLO 7: Team Work: (ILO 4)

- » Provide support for team projects in a way that promotes effective team dynamics to achieve team goals

## CAREER OPPORTUNITIES

The MSCE requires an understanding of both computer science and electrical engineering, to accommodate the dual role of computer engineers who are competent in system, algorithm, software, and hardware design.

Typical areas include: design and development of distributed systems, embedded systems, and computerized control systems; computer-aided design; FPGA development; ASIC design; and firmware development. Positions in the field include: system design engineer, system administrator, hardware designer, firmware designer, software engineer, verification engineer, test engineer, product engineer, quality-control engineer, customer support engineer, and applications engineer.

## Program Requirements

### REQUIRED COURSES:

- » 3 Core Courses (9 credit hours)
- » Capstone course - Project or Thesis (3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
- ITU Presents (1 credit hour)
- ITU Nuggets (2 credit hours)

### ELECTIVE COURSES:

- » Field Relevant Courses: 15 credit hours
  - » With approval from the ECE Department any course from
    - Department of Business Administration
    - Department of Computer Science
    - Department of Digital Arts
    - Department of Electrical and Computer Engineering
  - » Internship: 1-8 credit hours
  - » Transfer Credits: Up to 9 credit hours from a graduate program of a regionally accredited school with department chair's approval.
- 39 Total Credit Hours

### GRADE POINT AVERAGE (GPA):

A minimum 3.0 cumulative GPA is required for granting of the Master's degree.

### REQUIRED CORE COURSES

- » CEN 548 Computer Network Systems
- » ECE 502 Advanced Python Applications
- » EEN 541 Digital Signal Processing and System Analysis

## CAPSTONE COURSE

- » ECE 690 Capstone project or
- » ECE 698 Master Thesis
- INTERNSHIP
- » INT 593 Internship

## ITU PRESENTS

- » PRE-500 ITU Presents (1/3)

\*Students must take three ITU Presents courses for a total of 1 credit hour.

## ITU NUGGET COURSES

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
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## ELECTIVE COURSES

Computer Engineering Field Relevant: minimum of 5 courses:

- » CEN 551 Computer Architecture
- » CEN 556 Distributed Computing Systems
- » CEN 540 Network Security Techniques
- » CEN 542 Computer Vision and Image Processing
- » CEN 548 Computer Network Systems
- » CEN 581 Principle of Internet of Things
- » ECE 505 Machine Learning Fundamentals
- » ECE 510 Algorithms and Data Analysis
- » ECE 610 Algorithm on a Chip
- » ECE 646 IoT System Design
- » ECE 688 Special Topics in Computer Engineering
- » ECE 689 Independent Study
- » ECE 758 Advanced IoT System Design
- » EEN 520 ASIC Design I
- » EEN 525 ASIC Design II
- » EEN 629 System on a Chip (SOC) Design
- » EEN 766 Advanced Communication Systems
- » EEN 774 Advanced Wireless Communications
- » INT 593 Part-time/Full-time Internship

## MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

The Master of Science in Electrical Engineering (MSEE) degree program focuses on the following areas:

## CHIP DESIGN

The MSEE in Chip Design emphasizes the development of cutting-edge artificial intelligence integrated circuits (IC's), using FPGA, ASIC, or SoC techniques. Mixed-signal (analog and digital) design, MEMS, and RF chip design are also covered.

### IoT SYSTEM DESIGN

The MSEE in System Design emphasizes embedded systems, the Internet of Things (IoT), and distributed systems. Scientific computing, communications, algorithms and software implementations are also covered.

### Program Learning Outcomes (PLO)

The Program Learning Outcomes (PLO) define the educational outcomes of the MSEE degree program:

- » PLO 1: Fundamentals: (ILO 5)
- » Explain current and emerging technologies in IC chip design or system design in electrical engineering
- » PLO 2: Engineering Ability: (ILO 1)
- » Appraise electrical engineering problems using contemporary techniques
- » PLO 3: Research Ability: (ILO 6)
- » Conduct independent research to solve challenges in electrical engineering
- » PLO 4: Career Responsibility: (ILO 7)
- » Apply professional ethics in the definition, planning, and execution of engineering projects
- » PLO 5: Critical Thinking: (ILO 2)
- » Analyze engineering challenges to make evidence-based choices among various paradigms
- » PLO 6: Communication Skills: (ILO 3)
- » Present technical issues clearly in oral and written communications
- » PLO 7: Team Work: (ILO 4)
- » Support team effort through collaboration to achieve project goals
- » Career Opportunities

The MSEE requires an understanding not only of electrical engineering, but also computer algorithms and programming to fulfill the roles of chip design or system design engineers.

Typical career fields include: IC chip design, electronic design automation, embedded system design, computer-aided design, computerized control systems, sensor design and bioelectronics. Positions in the field include: logic design engineer, circuit design engineer, physical design engineer, verification engineer, test engineer, reliability engineer, and applications engineer.

### Program Requirements

#### REQUIRED COURSES:

- » 3 Core Courses (9 credit hours)

- » Capstone course - Project or Thesis (3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
- ITU Presents (1 credit hour)
- ITU Nuggets (2 credit hours)

#### ELECTIVE COURSES:

- » Field Relevant Courses: 15 credit hours
- » With approval from the ECE Department any course from
  - Department of Business Administration
  - Department of Computer Science
  - Department of Digital Arts
  - Department of Electrical and Computer Engineering
- » Internship: 1-8 credit hours
- » Transfer Credits: Up to 9 credit hours from a graduate program of a regionally accredited school with department chair's approval.

#### 39 Total Credit Hours

#### GRADE POINT AVERAGE (GPA):

A minimum 3.0 cumulative GPA is required for granting of the Master's degree.

#### REQUIRED CORE COURSES

- » CEN 548 Computer Network Systems
- » ECE 502 Advanced Python Applications
- » EEN 541 Digital Signal Processing and System Analysis

#### CAPSTONE COURSE

- » ECE 690 Capstone project
- or
- » ECE 698 Master Thesis

#### INTERNSHIP

- » INT 593 Internship

#### ITU PRESENTS

- » PRE-500 ITU Presents (1/3)
- \*Students must take three ITU Presents courses for a total of 1 credit hour.

#### ITU NUGGET COURSES

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
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## **ELECTIVE COURSES**

**Electrical Engineering Field Relevant: minimum of 5 courses:**

- » CEN 551 Computer Architecture
- » CEN 540 Network Security Techniques
- » CEN 542 Computer Vision and Image Processing
- » CEN 548 Computer Network Systems
- » CEN 556 Distributed Computing Systems
- » CEN 581 Principle of Internet of Things
- » ECE 505 Machine Learning Fundamentals
- » ECE 510 Algorithms and Data Analysis
- » ECE 610 Algorithm on a Chip
- » EEN 513 Microprocessor Design
- » EEN 520 ASIC Design I
- » EEN 525 ASIC Design II
- » EEN 616 Mixed Signal IC Design
- » EEN 618 Analog and RF IC Design
- » EEN 629 System On a Chip (SOC) Design
- » ECE 630 Quantum computing and Systems
- » EEN 635 Introduction to MEMS Design
- » ECE 646 IoT System Design
- » EEN 671 Wireless Communication Systems
- » EEN 717 Advanced Integrated Circuit Design
- » EEN 736 Advanced MEMS Design
- » EEN 739 Bioelectronics and Bioengineering
- » EEN 749 Advanced Digital Signal Processing
- » EEN 758 Advanced System Design
- » EEN 774 Advanced Wireless Communications
- » INT 593 Part-time/Full-time Internship

## **MASTER OF SCIENCE IN ELECTRICAL AND COMPUTER ENGINEERING**

As technology advances ever more rapidly, the computer industry and society as a whole need professional who possess a combination of electronic hardware and computer software skills. These skills should be developed in the context of modern systems to make them more practical and useful. Artificial Intelligence (AI) innovations and applications, the Internet of Things (IoT), and 5G wireless communications are changing many aspects of daily life, including driving, entertainment, communication, health care, and virtual and robotic assistants. These changes are creating many new engineering jobs in the fields of AI chip design, smart edge-device design, IoT system design, and intelligent system design.

The Master of Science in Electrical and Computer Engineering (MSECE) degree program will focus on the overlap of electrical engineering and computer engineering. MSECE students will study and also learn to design integrated hardware and software systems, using computer architectures, computing algorithms, IC design, distributed systems, intelligent system design and applications.

**Program Learning Outcomes (PLO)**

**The Program Learning Outcomes (PLO) define the educational outcomes of the MSECE degree program:**

- » PLO 1: Fundamentals: (ILO 5)
- » Explain current and emerging technologies in computer architecture, algorithms, and hardware and software design
- » PLO 2: Engineering Ability: (ILO 1)
- » Appraise integrated electrical and computer engineering problems using contemporary techniques
- » PLO 3: Research Ability: (ILO 6)
- » Conduct independent research to solve challenges in electrical or computer engineering
- » PLO 4: Career Responsibility: (ILO 7)
- » Apply professional ethics in the definition, planning, and execution of engineering projects
- » PLO 5: Critical Thinking: ILO 2)
- » Analyze engineering challenges to make evidence-based choices among various paradigms
- » PLO 6: Communication Skills: (ILO 3)
- » Present technical issues clearly in oral and written communications
- » PLO 7: Team Work: (ILO 4)
- » Support team effort through collaboration to achieve project goals
- » ABET Outcomes
- » The ABET Graduate Student Outcomes (GSO) further describe what MSECE students are expected to know and be able to do by the time of graduation. The GSO represent skills, knowledge, and abilities a student should possess as a condition for entry into the profession upon graduation.
- » GSO 1: An ability to meet the student's individualized study plan and to reach study objectives
- » GSO 2: An ability to conduct graduate-level engineering design and research
- » GSO 3: An ability to communicate professionally and work effectively in a team environment
- » The ABET Program Educational Objectives (PEO) describe what graduates are expected to attain within the first few years after graduation.
- » PEO 1: Graduates of the MSECE program solve computer and electrical engineering problems for high-tech industries, mainly in Silicon Valley

- » PEO 2: Graduates perform engineering design, research and product development
- » PEO 3: Graduates are effective team members or leaders

## » CAREER OPPORTUNITIES

The MSECE requires an understanding of both computer science and electrical engineering, to accommodate the dual role of computer engineers who are competent in system, algorithm, software, and hardware design.

Typical areas include: design and development of distributed systems, embedded systems, and computerized control systems; computer-aided design; FPGA development; ASIC design; and firmware development. Positions in the field include: system design engineer, system administrator, hardware designer, firmware designer, software engineer, verification engineer, test engineer, product engineer, quality-control engineer, customer support engineer, and applications engineer.

### Program Requirements

In addition to ITU's university-wide admission requirements, applicants to the MSECE program must have completed a minimum of 45 semester hours of college-level engineering topics, and a minimum of 30 semester hours of college-level mathematics and basic science courses.

Faculty will assess each student after admission, and will supervise students to develop individualized study plans with specific goals.

The MSECE program requires 39 credit hours for graduation consisting of at least 15 hours of required credits and 21 hours of elective credits, including a minimum of 6 elective credit hours in field-relevant courses. In addition, students will take a one-credit hour ITU present course and two credit hours of nugget courses from the interdisciplinary department.

A minimum of 30 credit hours must be earned through course work. If a student is eligible to take more than 6 credit hours of Internship, and chooses to do so, the total number of credit hours required for graduation will increase accordingly.

### REQUIRED COURSES:

- » 3 Core Courses (9 credit hours)
- » Capstone course - Project or Thesis (3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
- ITU Presents (1 credit hour)
- ITU Nuggets (2 credit hours)

### ELECTIVE COURSES:

- » Field Relevant Courses: 15 credit hours
- » With approval from the ECE Department any course from
  - Department of Business Administration

- Department of Computer Science
- Department of Digital Arts
- Department of Electrical and Computer Engineering
- » Internship: 1-8 credit hours

» Transfer Credits: Up to 9 credit hours from a graduate program of a regionally accredited school with department chair's approval.

### 39 Total Credit Hours

### GRADE POINT AVERAGE (GPA):

A minimum 3.0 cumulative GPA is required for granting of the Master's degree.

### REQUIRED CORE COURSES

- » CEN 548 Computer Network Systems
- » ECE 502 Advanced Python Applications
- » EEN 541 Digital Signal Processing and System Analysis

### CAPSTONE COURSE

- » ECE 690 Capstone project
- or
- » ECE 698 Master Thesis

### INTERNSHIP

- » INT 593 Internship

### ITU PRESENTS

- » PRE-500 ITU Presents (1/3)

\*Students must take three ITU Presents courses for a total of 1 credit hour.

### ITU NUGGET COURSES

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 552 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 553 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 554 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 555 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)

### ELECTIVE COURSES

Electrical and Computer Engineering Field Relevant: minimum of 5 courses:

- » ECE 504 Operating system design and implementation
- » ECE 510 Algorithms and Data Analysis
- » CEN 551 Computer Architecture
- » CEN 540 Network Security Techniques
- » CEN 542 Computer Vision and Image Processing

- » CEN 548 Computer Network Systems
- » CEN 556 Distributed Computing Systems
- » CEN 581 Principle of Internet of Things
- » EEN 513 Microprocessor Design
- » EEN 520 ASIC Design I
- » EEN 525 ASIC Design II
- » EEN 616 Mixed Signal IC Design
- » EEN 618 Analog and RF IC Design
- » EEN 629 System On a Chip (SOC) Design
- » EEN 630 Quantum Computing and Systems
- » EEN 635 Introduction to MEMS Design
- » ECE 646 IoT System Design
- » EEN 671 Wireless Communication Systems
- » EEN 717 Advanced Integrated Circuit Design
- » EEN 736 Advanced MEMS Design
- » EEN 739 Bioelectronics and Bioengineering
- » EEN 749 Advanced Digital Signal Processing
- » EEN 753 Advanced Machine Learning Engineering
- » EEN 758 Advanced System Design
- » EEN 774 Advanced Wireless Communications
- » INT 593 Part-time/Full-time Internship

## AI CONCENTRATION

The AI concentration is a discipline and specialization within the ECE department that follows the general ECE degree requirements and it is open to all students in MSEE, MSCE, and MSECE. In addition to ECE department students, this concentration is also open to students in MS computer science, MS software engineering and MS Information and Cyber security. Non-ECE students (MSCS, MSSE, and MSICS) must take the REQUIRED ELECTIVES and two courses from ELECTIVES in AI concentration to fulfill the concentration requirements. The core courses for non-ECE majors will be according to their respective major requirements.

The AI concentration has the same requirements as the general ECE degree and a total of 39 credit hours:

- » 3 core courses (9 credit hours)
- » 5 Elective courses (15 credit hours), 2 out of 5 are required electives

The internship, Capstone and other courses follow ECE general degree requirements listed below:

- » Internship (up to 9 credit hours)
- » Capstone/Thesis (3 credit hours)
- » ITU presents (1 credit hour)
- » Nugget courses (2 credit hours)

Total credit hours 39

## REQUIRED CORE COURSES

- » CEN 548 Computer Network Systems
- » ECE 502 Advanced Python Applications
- » EEN 541 Digital Signal Processing and System Analysis

## CAPSTONE COURSE

- » ECE 690 Capstone project or
- » ECE 698 Master Thesis

## REQUIRED ELECTIVE COURSES

- » ECE 503 AI Math fundamentals with Python application
- » ECE 505 Machine Learning Fundamentals
- » ECE 655 Deep Learning Fundamentals (Keras/TensorFlow 2.0, Pytorch)

## ELECTIVE COURSES

Minimum of 2 electives are required in order to fulfill the AI concentration requirement:

- » ECE 656 Reinforcement Learning (Pytorch)
- » ECE 657 Natural Language Processing (Keras/TensorFlow 2.0, Pytorch)
- » ECE 660 Parallel Implementation of ML Algorithms with GPUs (Python Mumba programming, Cuda programming with C++)
- » ECE 661 AI application development in Engineering and Science (self-driving cars, advanced computer vision/face recognition, AI application in Cybersecurity)
- » ECE 662 AI application development in business (Fintech/algorithmic trading)
- » ECE 663 Machine Learning project deployment and production (dockers and Kubernetes, Edge AI, iPhone/Android deployment)

## INTERNSHIP

- » INT 593 Part-time/Full-time Internship

## MINOR IN AI

The AI concentration is also available as a minor (4 courses/12 credit hours) to all students at ITU.

## REQUIRED COURSES FOR MINOR IN AI:

- » ECE 510 Machine Learning Fundamentals
- » ECE 502 Advanced Python Applications
- » ECE 655 Deep Learning Fundamentals (Keras/TensorFlow 2.0, Pytorch)

## ELECTIVE COURSES FOR MINOR IN AI:

- » One course from the ELECTIVE COURSES or REQUIRED ELECTIVES listed in AI concentration

12 Total Credit Hours

## DOCTOR OF PHILOSOPHY IN ELECTRICAL ENGINEERING

The Doctor of Philosophy degree in the field of Electrical Engineering (PhD-EE) is conferred by the Department of Electrical Engineering in recognition of competence in the subject field and the ability

to investigate engineering problems independently, resulting in an original contribution to engineering knowledge. The work for the degree consists of advanced studies in engineering, mathematics and related physical sciences; engineering research, preparation of a dissertation based on that research; a dissertation defense; and publication.

## ADMISSION REQUIREMENTS

Application to the doctorate program is reviewed and approved by the department offering the program. (Doctoral Program Council will be setting the campus-wide doctorate program policies.)

International applicants to low-residency or online doctoral programs must demonstrate fluency in spoken and written English. The proficiency can be assessed through writing samples and a personal or online documented interview.

PhD IS program allows up to thirty of the credits to be transferred or waived, according to the advanced standing students' previous learning or professional experiences. At least 6 credits of ITU regular courses are required before degree completion.

The Program Learning Outcomes (PLO) define the educational outcomes

## PROGRAM LEARNING OUTCOMES (PLO)

- » The Program Learning Outcomes (PLO) define the educational outcomes of the PhD-EE degree program:
- » PLO #1: Fundamentals
- » Formulate comprehensive solutions to problems in specialized aspects of electrical engineering. (Mapped to ILO #1, ILO #5)
- » PLO #2: Research Ability
- » Produce independent scholarly research, which contributes innovative ideas and concepts to the fields of science and/or engineering. (Mapped to ILO #2, ILO #6)
- » PLO #3: Career Responsibility
- » Perform career duties promptly, responsibly and professionally. (Mapped to ILO #7)
- » PLO #4: Communication
- » Produce clear, professional communication including for use in teaching, conferences, and publications. (Mapped to ILO #3)
- » PLO #5: Team Work
- » Manage team efforts towards an engineering and/or educational goal. (Mapped to ILO #4)

## CAREER OPPORTUNITIES

The PhD program in Electrical Engineering prepares

its graduates to be professionals and leaders in the fields of electrical and computer engineering in industry, academic, research, or other sectors of society.

### Program Requirements

60 credit hours beyond the Master's degree level, including:

30 hours of coursework and Independent Study

30 hours of Doctoral Dissertation

Passing a written qualification exam is required for admission to candidacy.

Passing a comprehensive oral examination is required with presenting dissertation topic proposal and sufficient preparation for advanced research for the proposed dissertation topic.

Passing a comprehensive, final oral defense examination is required to defend the PhD dissertation. Publication in an internationally recognized academic journal is required to complete the PhD dissertation.

### Doctoral Courses

Courses numbered 700 or above in the Electrical Engineering and Math courses are designed as PhD courses. Other courses may be accepted as PhD courses with the approval of the PhD advisor and chair of the ECE Department.

### Thesis Advisor

It is the student's responsibility to obtain consent from a faculty member in the student's major department to serve as his/her prospective thesis advisor upon acceptance into the PhD program. A PhD student and his/her advisor jointly develop a study plan for courses and research in a particular area, and submit to the chair of the department for approval.

### Study Program and Course Work

The student is required to complete a minimum of 60 credit hours of graduate credit beyond the master's degree. Of these, 30 credit hours may be earned through course work and independent study, and up to an additional 30 credit hours through the thesis process. All thesis hours are graded on a Pass/No Pass basis. A maximum of 15 semester credit hours with grade of B or above may be transferred from other regionally accredited institutions with approval of the EECE Department Chair.

### Qualification Examination

The qualification exam must be administered within two years of the date of admission for full-time students, and within three years for part-time students. The qualification exam can be retaken only once. The qualification examination will be in written form. There will be three fields within the examination. Mathematics is a required field. The student may choose the two other fields from among the four fields listed below:

- Integrated Circuit Design
- Bioelectronics Design
- Wireless Communications
- IoT System Design and Smart Cities

- Artificial Intelligence (AI)
- Some courses in the above areas are:
- Integrated Circuit Design (EEN 715, EEN 717)
  - Bioelectronics Design (EEN 717, EEN 736, EEN 739)
  - Wireless Communication (EEN 749, EEN 758, EEN 774)
  - IoT System Design (, , EEN 758)

#### **Whereas:**

EEN 717 Advanced Integrated Circuit Design  
 EEN 736 Advanced MEMS Design  
 EEN 739 Bioelectronics and Bioengineering  
 EEN 749 Advanced Digital Signal Processing  
 EEN 758 Advanced IoT System Design  
 EEN 774 Advanced Wireless Communications

#### **ADMISSION TO CANDIDACY**

A student who passes the qualification examination is considered as advanced to candidacy. A PhD candidate must approach his/her PhD advisor to assist with formation of a doctoral committee.

#### **Doctoral Committee**

The committee must consist of a minimum of three and a maximum of five members, including the dissertation advisor and the Department Chair. The committee must also include at least one member from outside the department, preferably from outside the University. Either the PhD advisor or Department Chair will serve as the chair of the committee.

The Doctoral Committee will review the proposed dissertation topic and recommend any necessary changes. For the candidacy to proceed, the committee must approve the topic.

#### **Comprehensive Examination**

Upon approval of the dissertation topic by the doctoral committee, the candidate shall request a comprehensive examination. The examination shall be an oral exam, the results of which demonstrate to the committee's satisfaction sufficient preparation in depth and breadth for the necessary advanced research. The comprehensive examinations must be completed within one year of passing the qualification examination. Comprehensive examinations may be repeated only once, in whole or in part, at the discretion of the PhD advisor.

#### **Dissertation Research**

The period following the comprehensive examination is devoted to research for the dissertation, although such research may begin before the examination is completed. After the Doctoral Committee approves the research topic, the PhD candidate should begin the completion of dissertation research.

#### **Publication**

One or more refereed articles, based on the dissertation research, must be accepted for publication in an internationally recognized academic journal, such as IEEE, IEE, ACM, or other journals approved by the Doctoral Committee.

#### **Teaching Requirement**

The PhD candidate must teach at least one Masters'-level course in order to demonstrate teaching ability. The teaching requirement must be completed prior to the dissertation defense.

#### **Dissertation Defense**

The dissertation must be made available to all examiners one month prior to the examination. The oral examination shall consist of a presentation of the dissertation results and the defense. The dissertation defense is open to the public, but only members of the Doctoral Committee may vote. The dissertation defense passes only through a unanimous vote.

#### **Program Completion**

At least one month prior to degree conferral, the candidate must submit to the Doctoral Program Council of the University two copies of the final version of the dissertation. The dissertation will not be considered as accepted until approved by the Doctoral Committee and publication acceptance. Each member of the Doctoral Committee must indicate his/her final approval by signature.

The University reserves the right to evaluate the undertakings and the accomplishments of the degree candidate in total, and award or withhold the degree as a result of its deliberations.

#### **Institutional Review Board (IRB) Involvement**

Research involving human subjects conducted at educational institutions is required to be in compliance with federal regulations. ITU's IRB, in accordance with federal regulations, reviews all research involving human subjects for compliance with applicable regulation and other best practices. This includes the DBA research proposals, prior to the data collection stage. Candidates are urged to understand their obligations in relation to their interactions with human subjects and the IRB by reviewing the [ITU IRB Handbook](#).

#### **Time Limit for Completing Degrees**

All requirements for the doctoral degree must be completed within eight years following acceptance into the Ph.D. program. Extensions will be allowed only in unusual circumstances and must be approved in writing by the Doctoral Program Council.

#### **Terminal Master's Degree**

Students who are not able to complete the dissertation after completing the required number of credit hours of coursework will receive a Terminal Master's degree, if 30 credits of PhD work have been successfully completed.

## COURSE DESCRIPTIONS

### COMPUTER ENGINEERING (CEN)

#### **CEN 540 NETWORK SECURITY TECHNIQUES (3)**

Prerequisites: None

Recommended: CEN 548

This course is designed to develop knowledge and skills for security in the network systems and focuses on design and implementation of network security solutions. The key areas of the network security are intrusion detection, virtual private networks, firewalls, web security, packet filtering, network layer security, and electronic mail security.

#### **CEN 542 COMPUTER VISION AND IMAGE PROCESSING (3)**

Prerequisites: None

Recommended: EEN 541

The course will cover concepts and techniques for image processing and computer vision with an emphasis on the state-of-the-art techniques currently used in academia and industry. Topics will include image filtering, edge detection, segmentation, object/image/face classification, object detection, morphological operators, object tracking, properties of human visual perception, sampling and quantization, image enhancement, image restoration, two-dimensional Fourier transforms, noise removal, image deblurring, image registration and geometric transformation, image/video compression, video communication standards, object recognition and image understanding.

#### **CEN 548 COMPUTER NETWORK SYSTEMS (3)**

Prerequisites: None

This course covers the theory and practice of essential computer network hardware and software. Topics include communication networks including local area networks (LANs), wide area networks (WANs) and protocols, network topologies, protocol hierarchy, network reference models, circuit vs. packet switching, signal transmission, modulation and multiplexing, Media Access Control (MAC), error detection, flow control, congestion control, and routing protocols such as RIP, IGRP, EIGRP, OSPF, IS-IS and BGP. This includes the standard protocols of IEEE and IETF, and Network Operating Systems (NOS). The class will also cover OSI (open system interconnection), TCP/IP, networking architecture, and cyber security.

#### **CEN 551 COMPUTER ARCHITECTURE (3)**

Prerequisites: None

Recommended: Working knowledge of digital logic and circuits

The course focuses on principles of computer architecture, offering students an overview of computer systems, CPU and GPU designs, computer arithmetic, instruction set architecture, pipelining, micro-programming techniques, memory hierarchies and management, input/output subsystem organization, and performance measurement. Neuromorphic and other potential future computer architectures will be studied.

#### **CEN 556 DISTRIBUTED COMPUTING SYSTEMS (3)**

Prerequisites: None

This course covers several important topics in distributed systems, including map-reduce, stream processing, cloud computing, remote service invocation (RPC), web services, service registration and discovery, data synchronization, service replication, cyber-security, and fault tolerance.

#### **CEN 581 PRINCIPLE OF INTERNET OF THINGS (3)**

Prerequisites: None

This course provides the fundamentals of the Internet of Things. It focuses on system collaborating various device protocols, coordinating recovery data from sensors, providing local control of assets, and best reuse of existing resources and infrastructures. Related technologies, architectures, and protocols aimed at improvement of system efficiency, resource sharing, interoperability, and intelligent use of sensors will be introduced. With seamlessly connected sensor devices and cloud databases, IoT makes information management systems more efficient, intelligent, and globally applied. User interfaces of mobile devices with app implementation and system security will be discussed.

#### **CEN 653 CHALLENGE OF EDGE DEVICE DESIGN (3)**

Prerequisites: None

This course emphasizes the challenges of edge device design and technologies. The key topics include condensed and precise structure design, reliability and quality, security, and energy efficiency. The course also covers design redundancy, device location, and performance.

### ELECTRICAL AND COMPUTER ENGINEERING (ECE)

#### **ECE 502 ADVANCED PYTHON APPLICATIONS (3)**

Prerequisites: None

Recommended: Familiarity with Python/Introduc-

## **tion to Python**

This is an advanced course in Python programming that covers features of the language and its libraries. Students learn about advanced data structures and language constructs such as linked lists, generators and decorators. The application topics focuses on areas relevant to AI discipline such as parallel programming using threads and processes, network programming (client-side and server-side), database programming, text processing and regular expressions, and web scraping.

### **ECE 503 AI MATH FUNDAMENTALS WITH PYTHON APPLICATION (3)**

Prerequisites: None

Recommended: undergraduate level probability and statistics and linear algebra

Key areas of mathematics required for deep understanding of AI and Machine Learning concepts are discussed. A review of statistics and probability such as basic definitions and inferential statistics are given. A review of matrix algebra and basic calculus is given. All concepts are implemented using Python libraries such as Numpy and Scipy.

### **ECE 504 OPERATING SYSTEM DESIGN AND IMPLEMENTATION (3)**

Prerequisites: None

This course establishes the foundation for understanding the design of a modern Operating System. The course covers an overview, history of OS development, basic concepts, and the structure of operating system. The course addresses the most important functions offered by an operating system including the synchronization and scheduling of process and threads, the virtual memory and memory management, and Input/Output and file system. The course will also touch on other issues such as system calls, device drivers for hardware independence, kernel, Linux shell programming, and protection.

### **ECE 505 MACHINE LEARNING FUNDAMENTALS (3)**

Prerequisites: None

This course discusses the fundamentals of machine learning. Topics include, supervised/unsupervised learning, regression, decision trees, ensemble techniques, Vector Support Machines, perceptron and multilayer perceptron. The course focuses on implementation of these algorithm in Python using Scikit-learn library. This course is designed to build the foundation of machine learning and AI and is a prerequisite for most of the advanced courses in AI and Deep Learning.

### **ECE 510 ALGORITHMS AND DATA ANALYSIS (3)**

Prerequisites: None

This course discusses computer algorithms as applied in the computer and electrical engineering fields. It covers fundamental techniques of design, analysis and implementation, including artificial neural networks, machine learning and deep learning, object recognition, and optimization algorithms. Big data and data mining techniques will be covered. Course project is designed to strengthen students' problem-solving capabilities.

### **ECE 610 ALGORITHM ON A CHIP (3)**

Prerequisites: ECE 510 or equivalent

Dedicated integrated circuits which implement scientific computing algorithms at the hardware level improve speed and energy efficiency. The course introduces on-chip implementations of parallel computing algorithms, artificial-intelligence (AI) algorithms, deep learning algorithms, etc. A Tensor Processing Unit (TPU) developed for neural network deep learning will be used as a case study. Students are required to implement an algorithm on a chip using the knowledge learned from the course.

### **ECE 646 - IOT SYSTEM DESIGN (3)**

Prerequisites: none

Students will learn the fundamentals of IoT system design using Raspberry Pi boards running the Linux operating system. Students will work with system peripherals, e.g., GPIO, UART, I2C, SPI, and USB; wireless data communications, e.g., Bluetooth Low Energy, WiFi, and Zigbee; and web services, e.g., Amazon Web Services (AWS). Application programming in Python and JavaScript (Node.js) will be used to complete labs that are designed to give students hands-on experience in IoT system designs.

### **ECE 655 DEEP LEARNING FUNDAMENTALS (3)**

Corequisites: ECE 510

This course focuses on Deep learning concepts including convolutional neural networks, recurrent neural networks, auto encoders, Generative Adversarial Networks (GAN) and their implementation. The implementation of these algorithms will be based on the state-of-the-art industry tools such as TensorFlow 2.0/Keras or Pytorch frameworks. All students are required to implement the above Deep Learning architectures in a real-world example in the final project/signature assignment.

### **ECE 656 REINFORCEMENT LEARNING (PYTORCH) (3)**

Prerequisites: ECE 655

The focus of this course is on reinforcement learning (RL) and deep reinforcement learning (DRL) as key areas in artificial intelligence field and their implementation using Pytorch and Keras frameworks. Topics include RL formalism, Markov decision pro-

cess, OpenAI Gym API and PyTorch, Deep Q-Network, application of RL in stocks trading, chatbots, web navigation, and AlphaGo Zero game.

### **ECE 657 NATURAL LANGUAGE PROCESSING (KERAS/TENSORFLOW 2.0, PYTORCH) (3)**

Prerequisites: ECE 655

The intent of the course is to present a fairly broad graduate-level introduction to Natural Language Processing (NLP, a.k.a. computational linguistics), the study of computing systems that can process, understand, or communicate in human language. The primary focus of the course will be on understanding various NLP tasks such as word embedding, automatic machine translation, algorithms for effectively solving these problems which relies heavily on deep learning architectures. All students are required to implement the concepts and algorithms taught in the course in a real-world example in the final project/signature assignment.

### **ECE 660 PARALLEL IMPLEMENTATION OF ML ALGORITHMS WITHGPUS (3)**

Prerequisites: ECE 502

The use of Graphics Processing Units (GPU) for graphics and game processing has been known for some time, but their power for general parallel computation has only recently been explored. Use of GPUs or High Performance Computing (HPC) can help speed up AI algorithms such as complex neural networks architectures by orders of magnitudes. This course covers programming techniques for the GPU. The course will introduce NVIDIA's parallel computing language, CUDA. The implementation of Cuda programming could be done in Python (Numba) or C++. Beyond programming, this course will also discuss GPU architecture, high performance computing on GPUs, parallel algorithms, CUDA libraries, and applications of GPU computing.

### **ECE 661 AI APPLICATION DEVELOPMENT IN ENGINEERING AND SCIENCE (3)**

Prerequisites: ECE 655

The intent of this course is to cover the key application areas of AI and Deep Learning in a technical field such as self-driving cars that combines computer vision technology with advanced lidar sensing, advanced computer vision/face recognition, and AI application in Cybersecurity. Each time the course focuses in one of the application areas. All students are required to implement the concepts and application areas in the course in a real-world example in the context of a final project/signature assignment.

### **ECE 662 AI APPLICATION DEVELOPMENT IN BUSINESS (3)**

Prerequisites: ECE 655

The intent of this course is to cover the key application areas of AI and Deep Learning in business and decision-making applications such as customer behavior modeling, Fintech, algorithmic trading, customer-service bots and AI-based advertising. All students are required to implement the concepts and application areas in the course in a real-world example in the context of a final project/signature assignment.

### **ECE 663 MACHINE LEARNING PROJECT DEPLOYMENT AND PRODUCTION (3)**

Prerequisites: ECE 655

This course focuses on the implementation of AI system on the cloud or an edge device. The course discuss efficient ways of building an AI pipeline, a Python package, how to serve a REST API, testing environment

(dockers and Kubernetes, Edge AI, deploying to Horoku, dockerization and Kubernetes. Students will work on a deep learning project and deploying on the AWS cloud using the above techniques.

### **ECE 688 SPECIAL TOPICS IN COMPUTER ENGINEERING (1-3)**

Prerequisites: None

The course offers a relatively new subject that is not currently available in the catalog, but will be of great relevance to computer engineering. It consists of lectures, readings, homework, presentations and projects determined by the instructor.

### **ECE 689 INDEPENDENT STUDY (1-3)**

Prerequisites: Approval by Department Chair

Independent Study allows students to conduct independent research on an approved topic in computer or electrical engineering, prepare a technical report, and defend it in front of a faculty advisor.

### **ECE 698 MASTER THESIS (3)**

Prerequisites: Approval by Department Chair

Thesis research is arranged with a thesis advisor upon an approval by chair of the department. Students will conduct independent research in computer engineering, prepare a thesis, and defend it in front of a committee consisting of a faculty committee designated by the EECE department chair.

### **ECE 891 INDEPENDENT STUDY (1-3)**

Prerequisites: Approval by PhD Advisor

Independent Study is designed for PhD students. The student will study a special interest in electrical engineering under the direction of an instructor who is knowledgeable in the field. It may consist of readings, homework, tests, presentations and proj-

ect reports assigned by the instructor.

## **ECE 907 DOCTORAL DISSERTATION THESIS**

**(3-9)**

Prerequisites: Approval by PhD Advisor

Doctoral Dissertation Thesis consists of a series of research studies and is arranged with thesis advisor for PhD candidates upon having his/her thesis topic approved. Students will conduct independent research in electrical or computer engineering, prepare for publication, prepare a thesis and defend it in front of a committee consists of a number of faculty designated by Department Chair. students are eligible to take 700 series as elective courses.

## **ELECTRICAL ENGINEERING**

### **EEN 511 INTEGRATED CIRCUIT DESIGN (3)**

Prerequisites: None

Recommended: College Level Physics

This course provides an overview of IC (integrated circuit) design and methods. The course introduces the IC design procedure, analog and digital circuits, logic, schematic and layout design techniques, design verification, high-speed circuits and low-power design techniques. Implementation of artificial intelligence on a chip will be discussed. Course project will involve using EDA tools or FPGA implementation.

### **EEN 513 MICROPROCESSOR DESIGN (3)**

Prerequisites: None

Recommended: CEN 551

The course introduces various microprocessor architectures, characteristics, and applications. It delivers to students a specific microprocessor design for understanding functional block design and design considerations. Neuromorphic computing architecture is studied.

### **EEN 520 ASIC DESIGN I (3)**

Prerequisites: None

Recommended: Working knowledge of Digital Structure

The course focuses on ASIC design principles, consideration, and design implementation with logical design, verification, synthesis, and design analyses of function, timing, power, signal integrity, design-for-testability and others. A design project with a front-end ASIC design flow will be assigned for practice.

### **EEN 525 ASIC DESIGN II (3)**

Prerequisites: None

Recommended: Working knowledge of Digital Structure

The course emphasizes back-end ASIC design implementation with floorplan, placement and routing,

layout verification and parameter extraction, design for manufacture and post-layout analysis with consideration of timing-driving and power-aware layout. A design project with a back-end ASIC design flow will be assigned for practice.

### **EEN 541 DIGITAL SIGNAL PROCESSING AND SYSTEM ANALYSIS (3)**

Prerequisites: None

This course focuses on analysis of discrete-time signals in both time and frequency domains, modeling of electrical systems, and the design of finite impulse response (FIR) and infinite impulse response (IIR) filters. The sampling theorem, reconstruction process, discrete Fourier transform (DFT) and its computation with the fast Fourier transform (FFT) and applications are discussed. Design and implementation of FIR and IIR filters and multi-rate signal processing, decimation, interpolation, least mean square (LMS), normalized least mean square (NLMS), sample rate conversion, and efficient implementation are covered. Application of communications systems and system analysis are introduced. Students will learn Fourier techniques, applications in communications systems, and implementation of signal processing software and hardware.

### **EEN 616 MIXED SIGNAL IC DESIGN (3)**

Prerequisites: EEN 511

The course focuses on the intersection of the digital and analog design worlds. The course will introduce various SPICE simulators for circuit analysis as well as Matlab for system analysis. The students will be expected to have basic analog circuit and digital design knowledge, and to have used the principal EDA tools like SpectreRF and Verilog. The course will cover mixed signal subsystems such as A/D converters, digital PLLs, embedded CPUs with thermal sensors, DDR PHYs and others. Mixed-signal issues like substrate noise will be explored in detail. The course will also include a significant design project with a simple embedded CPU.

### **EEN 618 ANALOG AND RF IC DESIGN (3)**

Prerequisites: Knowledge of Electrical Circuits

This course covers fundamentals of CMOS analog and RFIC design. The course starts with basic design and analysis of CMOS analog amplifiers, frequency response of cascaded amplifiers, gain-bandwidth considerations, concepts of feedback, stability, and frequency compensation, and moves forward to electromagnetics like high-Q inductor design, device modeling and layout issues. The course examines in detail the primary CMOS RF sub-circuits like LNAs, power amplifiers, fractional N synthesizers, mixers and filters. A design practice will be provided using SpectreRF, with the passive components designed using Sonnet or equivalent modeling tool. The circuits will be laid out using Cadence Virtuoso and the parasitic parameters will

be extracted using Assura.

### **EEN 629 SYSTEM ON A CHIP (SOC) (3)**

Prerequisites: None

The course introduces methods, considerations and analysis of System on Chip design fundamentals. VLSI architectures, systolic arrays, self-timed systems, system verification, design flow and implementation will be covered. System C and/or System Verilog will be applied for practice.

### **EEN 630 QUANTUM COMPUTING AND SYSTEMS (3)**

Prerequisites: None

The course gives a succinct introduction to quantum mechanics, with emphasis on the basic concepts and a selected range of quantitative techniques to analyze quantum systems. It will describe the working principles of nano-engineered devices that are designed to be the building blocks of future quantum information and communication systems. The relevance of quantum mechanics in advanced electronic devices will be illustrated by discussing in detail several topics such as single-electron transistors, quantum point contacts, quantum transport systems, superconducting quantum interference device, charge, phase and flux qubits, quantum dots (artificial atoms), high electron mobility transistors, super conducting devices, and quantum transport in mesoscopic structures.

### **EEN 635 INTRODUCTION TO MEMS DESIGN (3)**

Prerequisites: None

The course introduces MEMS design fundamentals, microfabrication techniques and analysis of a variety of MEMS structures including switches, accelerometers and microcavities. The focus will be on hands-on design using COMSOL and Matlab and modeling the resulting structures' electromechanical properties. The class will have a design project.

### **EEN 671 WIRELESS COMMUNICATION SYSTEMS (3)**

Prerequisites: None

The course provides an overview of wireless communication systems in use today as well as some of the emerging systems such as 5G cellular systems. It presents wireless challenges and wide range of wireless applications, from cellular systems to wireless local area networks (WLAN), to satellite communications, and their underlying technologies. It will examine the pros and cons of wireless communication and describe both infrared and radio technologies. It will also survey the representative 2G, 3G and 4G cellular systems as well as representative WLAN systems.

### **EEN 698 MASTER THESIS (3)**

Prerequisites: Approval by Department Chair

Thesis research is arranged with a thesis advisor upon an approval by chair of the department. Students will conduct independent research in computer engineering, prepare a thesis, and defend it in front of a committee consisting of faculty designated by department chair.

### **EEN 717 ADVANCED INTEGRATED CIRCUIT DESIGN (3)**

Prerequisite: EEN 511 Integrated Circuit Design

The course reviews comprehensive knowledge of integrated circuit (IC) design, from system-level, to register-transfer level (RTL), to gate-level, and finally to transistor-level designs. The course also reviews analog IC designs including high-frequency amplifiers, high-Q oscillators, low-noise circuits, non-linear systems, active filters, A/D converters, power amplifiers, power management, and mixed signal IC designs. The course will require the use of HSPICE and some electromagnetic modeling and analysis.

### **EEN 736 ADVANCED MEMS DESIGN (3)**

Prerequisites: EEN 635

The course applies parametric design and optimal design to micro-electro-mechanical systems with an emphasis on design and micro-mechanical simulation. The primary thrust of the course will be experimental, with an actual design and fabrication project to be built in a local MEMS fabrication facility. The design will be analyzed for electromechanical properties and compared to the simulations.

### **EEN 739 BIOELECTRONICS AND BIOENGINEERING (3)**

Prerequisites: None

This course reviews key concepts in biology, biochemistry, biological interfaces, and critical human body systems from an engineering researcher's perspective. Additional topics include electronic sensors, MEMS, optics, spectroscopy, lab-on-a-chip technologies, analog electronics and digital signal analysis. Laboratory sessions expose the student to bioelectronics systems research and engineering.

### **EEN 749 ADVANCED DIGITAL SIGNAL PROCESSING (3)**

Prerequisites: EEN 541

The course focuses on advanced topics in signal processing, including: filter banks and multi-rate signal processing, time-frequency analysis, short time Fourier transform (STFT), wavelet transform, linear prediction and optimum linear filters, and adaptive filtering. These lectures will connect these concepts to applications in biomedical imaging, computational photography, image and video compression, noise cancellation, echo cancellation and other areas.

## **EEN 758 ADVANCED IOT SYSTEM DESIGN (3)**

Prerequisites: ECE 646

The course exposes students to the state-of-the-art design and analysis techniques for embedded systems. Fueled by advances in semiconductor technology, new research areas in advanced embedded system design have emerged. The main topics include system modeling, performance and power/energy analysis and estimation, system-level partitioning, synthesis and interfacing, co-simulation and emulation, intelligent edge devices, and reconfigurable computing platforms. Research papers with significant impacts on the above topics are studied in detail. Class discussions and research project participation are integral parts of the course.

## **EEN 774 ADVANCED WIRELESS COMMUNICATIONS (3)**

Prerequisites: EEN 671

The course focuses on up-to-date digital communication systems and technologies. It covers detection, estimation, and modulation and information theory principles. The course will discuss how to apply the techniques to calculate performance limits and strategies for wireless communication systems. The course will further analyze and compute channel capacity and derive optimal communication strategies for memoryless deterministic/fading single-antenna/multi-antenna single-user/multiuser channels (e.g., discrete memoryless channels, AWGN, multiple access channels, MIMO, broadcast channels). The concepts are illustrated using examples from the wireless systems, such as IEEE 802 family, 3G, LTE, 5G and proposed future technologies.

## **INTERNSHIP (INT)**

### **INT 593 INTERNSHIP (1/3-3)**

This course consists of participation in a full-time or part-time internship experience, related to the student's field of study under the supervision of both an approved internship provider and a faculty advisor. This course provides practical, hands-on training in a relevant industry to enhance classroom learning. A student may take a maximum of 10 credit hours of INT 593.

Electrical Engineering (EEN)

## **IDS (INTERDISCIPLINARY SCIENCES)**

### **IDS 550 ITU NUGGETS (COSILIENCE "UNITY OF KNOWLEDGE" CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course. Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a single credit unit, which is 5 lecture hours (or 10 lab hours or 15 practicum hours). A nugget course is a

bite-sized project or course, manageable for a busy schedule. Nugget courses are designed to provide content from across multiple disciplines. Nuggets can start three times during the term in an online and/or in-class format of delivery. All ITU Nuggets are listed under the Interdisciplinary Department.

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### **PRE-500 ITU PRESENTS (1/3)**

Prerequisites: None

ITU Presents, formerly “Joint Seminar,” was created and first taught by ITU’s Founder, Professor Shu-Park Chan, who invited guest speakers, typically Silicon Valley industry leaders, to speak on topics of their personal interest followed by a Q&A session with ITU students. Historically, ITU Presents remained the favorite and reportedly “most useful” class of ITU alumni, as it gave ITU students the ability to listen to the real-life experiences of famous technologists who often shared their early career struggles, strategies, and successes with students.

### **DEPARTMENT RESEARCH ACTIVITIES**

Five research labs are established within the department:

- Artificial Intelligence (AI)
- Bioelectronics (BE)
- Embedded Systems (EM)
- System-on-Chip (SoC)
- Green Energy (GE)

Research focuses on cutting-edge innovation and application, including autonomous movement, deep learning in engineering, object recognition, non-invasive glucose sensors, smart battery management systems, and cloud-based, closed-loop energy-management systems.

Courses numbered 700 or above are designed for the PhD-EE program. Master’s degree students are eligible to take 700 series as elective courses.

## FACULTY

-**Dr. Jahan Ghofraniha, PhD**, The University of British Columbia.

More than 25 years of experience in the industry as a CTO and founder of startup companies in the areas of AI system design and implementation, medical devices and telecommunications. Extensive academic experience for over twenty years as the Dean and department chair at private and public universities.

-**Dr. Dominik Schmidt, PhD**, Stanford University. Technology Analyst at QVT Financial LP, Former Senior Director of Technology Development at Intel. Advisor of Bioelectronics Research Lab.

-**Dr. John Kim, PhD**, New Mexico State University. Served as Senior Engineer at Broadcom, District Manager at Panasonic, and a consultant at Electronics, Telecom communications Research Institute (ETRI), Sybersay Communications, and Bell Labs in Lucent Tech.

-**Dr. Ted Sun, PhD**, Santa Clara University. Served as Engineer at Integra ted Device Technology and Cadence.

-**Dr. Qing Zhu, PhD**, UC Santa Cruz. Engineering Manager at eveRAM Technology Inc., Intel and SanDisk.

-**Dr. Faramarz Mortezaie, PhD**, University of California, Irvine. Researcher in UC Irvine Robotics lab. Extensive experience in the field of chip design for testability and manufacturing. More than twenty years of teaching experience.

## DEPARTMENT OF ENGINEERING MANAGEMENT

### MISSION

The mission of the Engineering Management Department at ITU is to train graduate students to become both competent managers of projects in technology-oriented businesses and entrepreneurial leaders.

### INSTITUTIONAL LEARNING OUTCOMES (ILOS)

1. Problem Solving: Construct, interpret, analyze, and evaluate information and ideas derived from a multitude of sources in order to reach reasoned solutions or alternative strategies to solve problems.
2. Critical Thinking: Analyze facts and information from multiple sources in order to assess the relevance and synthesize that information in order to formulate meaningful arguments and conclusions.
3. Communication: Interact clearly and effectively in written and oral forms with personal and professional constituencies.
4. Team Work: Operate collaboratively and respectfully as members and leaders of diverse teams and organizations.
5. Technical Literacy: Work responsibly, appropriately and effectively, using technology tools to access, manage, integrate, evaluate, create and communicate information and innovation.
6. Research: Identify and implement systematic methodologies for analyzing, discovering, understanding, and interpreting materials, information and behaviors.
7. Responsibility: Practice sound, ethical, and social responsibility in professional and personal endeavors and decision-making.

### MASTER OF SCIENCE IN ENGINEERING MANAGEMENT

The Master of Science in Engineering Management degree program provides practical training in the essential elements of running a technology-focused business including instruction in project management, strategic planning, organization, collaboration, and communication, product management and marketing, engineering economy, quantitative analysis, operations and quality engineering.

Overall, training in engineering management provides engineers, and others who want to be respected as technical leaders, with competitive knowledge and skill to work in Silicon Valley-type environments. In other terms, Engineering Management is the Future of Engineering Education™.

Currently, companies are showing a preference for technical graduate students who have both a deep understanding of technology and who also show cross-training in business management knowledge and skills. It is with this emphasis that the Engineering Management Department focuses its training.

Moreover, given the effects of globalization on technology-based businesses, the ITU masters in engineering management degree emphasizes the need for candidates to develop a strong appreciation and awareness of emerging technologies and to be able to adapt to the constant impact of change in the business environment.

The standards to which the Engineering Management program aligns itself include models provided from universities who are members of the Masters in Engineering Management Program Curriculum (MEMPC). This is a prestigious group of nine top-tier universities in America including Cornell University, Dartmouth, Duke, Johns Hopkins, MIT, Northwestern University, Purdue, Tufts University, and the University of Southern California.

The ITU department studies guidance promoted by the American Society of Engineering Management (ASEM) and participates in events and collaborates with the local chapter of the IEEE Technology and Engineering Management Society (TEMS).

### PROGRAM LEARNING OUTCOMES (PLOS)

Upon completion of this program, graduates will:

1. Manage engineering functions in organizations, such as product and project teams and functional groups delivering products and services. (Mapped to: ILO#7, Individual Responsibility)
2. Create and apply a systems-approach to analyzing problems and managing projects. (Mapped to: ILO#1, Problem Solving)
3. Interpret and practice principles of engineering management combined with the ability to communicate and operate collaboratively and respectfully as leaders and members of diverse teams and organizations. (Mapped to ILO#3, Communication Literacy and ILO#4, Team Work)
4. Identify and implement systematic methodologies and knowledge in areas such as project management, quality management and business analysis, and innovation management. (Literacy and ILO#6, Research)
5. Identify new business opportunities and develop business strategies and plans to capitalize on new venture ideas. (Mapped to ILO#2, Critical Thinking)

### CAREER OPPORTUNITIES

Upon completion of the Engineering Management master's program at ITU, students prepare themselves for positions such as project manager, team

leader, business process manager, business architect, quality manager, IT manager, business consultant, IT consultant, and more.

## **MASTER OF SCIENCE ENGINEERING MANAGEMENT PROGRAM REQUIREMENTS (MINIMUM 39 CREDIT HOURS)**

### **MANDATORY COURSES (25 CREDIT HOURS):**

- » 3 Core Courses (9 credit hours)
- » 3 Required Courses (9 credit hours)
- » Capstone course - Project or Thesis (3 credit hours)
- » Internship (1 credit hour)
- » Nugget courses (up to 3 credit hours)
- ITU Presents (1 credit hour)
- ITU Nuggets (2 credit hours)

### **ELECTIVE COURSES (MINIMUM 14 CREDIT HOURS):**

Elective courses may include any combination of the following:

- » Internship - maximum of 9 credit hours (including 1 required credit hour)
- » Open elective
- » Transfer Credits from a graduate program of a regionally accredited school (up to 9 credit hours)

#### **GRADE POINT AVERAGE (GPA):**

A minimum 3.0 cumulative GPA is required for granting of the Master's degree.

### **CORE COURSES**

All core courses have to be taken within the first three trimesters. Students must take at least one core course each term. It is recommended that in the first trimester students take two core courses if they are offered. Any exceptions to this policy are subject to the Department Chair approval.

The three core courses are:

- » EMG 500 Principles of Engineering Management
- » MGT 575 Project Management
- » EMG 502 Organizational Management

### **REQUIRED COURSES**

Students are required to complete at least one course from each of the following three groups (A, B, C) for a total of 9 credit hours:

- » EMG 503 Product Management
- EMG 506 Systems Engineering and Architecture
- MIS 527 Technology and Operations Management
- » EMG 579 Business Process Management
- MGT 611 Lean Six Sigma
- BUS 516 Principles of Quality Management
- » EMG 507 Operations Research
- BUA 500 Principles of Business Analytics

### **BUS 518 Applied Statistics**

#### **CAPSTONE COURSE**

Students are required to take one course from the following  
EMG 690 Capstone Project  
or  
EMG 697 Thesis

### **ITU PRESENTS**

- » PRE-500 ITU Presents (1/3)  
(3 courses for a total of 1 credit hour)

### **ITU NUGGET COURSES (2 CREDIT HOURS)**

- » IDS 550 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
- » IDS 551 ITU Nuggets - Consilience "Unity of Knowledge" Content (½ - 2 credit hours)
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### **OPEN ELECTIVE COURSES**

A sufficient number of Elective Courses from Engineering Management Program must be completed to bring the total of credit hours to 39 which may include a maximum of 9 internship credit hours (Including 1 credit hour of required internship).

### **ELECTIVE COURSES**

- » EMG 503 Product Management
- » EMG 506 Systems Engineering and Architecture
- » EMG 507 Operations Research
- » EMG 511 Technology Management and Entrepreneurship
- » EMG 554 Management Consulting
- » EMG 579 Business Process Management
- » EMG 688 Special Topics
- » EMG 689 Independent Study

With approval from the Chair of the Engineering Management Program students can also choose courses from the following departments:

- Business Administration
- Computer Science
- Digital Arts
- Electrical and Computer Engineering

### **ENGINEERING MANAGEMENT - MINOR PROGRAM**

To obtain a Minor in Engineering Management Department, student is required to complete 4 courses

for a total of 12 credit hours.

**Note 1:**

To pursue a Minor in Engineering Management, students should build the list of the courses, which includes one required core course and 3 elective courses. Students must obtain approval from the Chair of the Engineering Management Program prior to initiating their Minor program. Courses taken part of the other programs will not be counted for Minor.

**Note 2:**

Minor program from other departments:

To obtain a Minor from the other Departments, students are required to complete 4 courses for a total of 12 credit hours from the other programs, such as MBA, CS, SE, EE, and DA. Students need to consult the appropriate Department Chair for the required minor program courses

**REQUIRED CORE COURSE**

**EMG 500 Principles of Engineering Management**

Choose 3 courses from the following courses (9 credit hours)

**ENGINEERING MANAGEMENT ELECTIVE COURSES**

EMG 502 Organizational Management

EMG 503 Product Management

EMG 506 Systems Engineering and Architecture

EMG 507 Operations Research

EMG 579 Business Process Management

MGT 575 Project Management

MGT 611 Lean Six Sigma

MIS 527 Technology and Operations Management

BUA 500 Principles of Business Analytics

BUS 516 Principles of Quality Management

BUS 518 Applied Statistics

## **COURSE DESCRIPTIONS**

### **ENGINEERING MANAGEMENT (EMG)**

#### **EMG 500 PRINCIPLES OF ENGINEERING MANAGEMENT (3)**

Prerequisites: None

This course provides an overview of the essential skills relevant to managing engineering organizations in a variety of industries. Together with the complementary course EMG 502, this course addresses the question, "What does it take to be an effective engineering manager?" To answer this question, EMG 500 uses guidelines from the Engineering Management Body of Knowledge (EMBOK) of the American Society of Engineering Management. Major EMBOK domains covered by this course include: strategic planning, marketing and sales management, financial resource management and legal issues in engineering management.

#### **EMG 502 ORGANIZATIONAL MANAGEMENT (3)**

Prerequisites: None

This course provides an overview of the essential skills relevant to managing engineering organizations in a variety of industries. In combination with the complementary course EMG 500, this course addresses the question, "What does it take to be an effective engineering manager?" Using guidelines from the Engineering Management Body of Knowledge (EMBOK) of the American Society of Engineering Management and other sources, this course covers topics such as: managing and motivating knowledge workers, communications, conflict and negotiation management, organization design, culture and change management and innovation management.

#### **EMG 503 PRODUCT MANAGEMENT (3)**

Prerequisites: None

The product manager is responsible for the strategy roadmap, and feature definition of a product or product line. In this course, students will learn about the general role of the product manager in technology-oriented businesses.

#### **EMG 506 SYSTEMS ENGINEERING AND ARCHITECTURE (3)**

Advanced information and electronics systems consist of complex software, hardware, and IP (Intellectual Property) components, cost many millions of dollars, and employ hundreds of engineers and engineering managers.

This course presents the system design methodologies used for architecting, designing, and implementing of such systems emphasizing on the role of engineering managers. We will illustrate these methodologies using several example systems such

as recent Artificial Intelligence -based processors, advanced medical devices, self-driving, self-flying, and cybersecurity systems.

#### **EMG 507 OPERATIONS RESEARCH (3)**

Prerequisites: None

Operations research is the study of scientific and mathematical techniques for decision making. It has applications to a variety of engineering management problems such as scheduling and time management, operations and supply chain optimizations, network and packet routing, inventory management and enterprise resource planning. This course will offer an introduction to operations research with emphasis on optimization and simulation. Students will learn how to apply the most powerful modeling and simulation techniques of operations research to common engineering management problems, from problem analysis and formulation to mathematical modeling, simulation, and solution interpretation.

#### **EMG 511 TECHNOLOGY MANAGEMENT AND ENTREPRENEURSHIP (1-3)**

Prerequisites: None

This course focuses on the connection between entrepreneurship and the creation of new technologies that drive economic development and the creation of wealth. A second area of study focuses on the existence or establishment of an "innovation ecosystem" to create and sustain economic development.

#### **EMG 554 MANAGEMENT CONSULTING (1-3)**

Prerequisites: None

This course is aimed at those specifically interested in consulting careers and/or whose future jobs involve working with consultants. Students will learn the basic principles that apply to any consulting-based approach and explore a range of topics that define consulting knowledge. These topics cover the consulting process from preparation for and delivery of client engagements to management of engagement-related obstacles and the development of advising skills.

#### **EMG 579 BUSINESS PROCESS MANAGEMENT (3)**

Prerequisites: None

Business process management is a discipline that uses various methods to discover, analyze, measure, improve and optimize business processes in an organization. In this course, students will learn about the basic methods used to analyze business processes and will develop skills in conducting business process analysis.

#### **EMG 688 SPECIAL TOPICS (1-3)**

Prerequisites: None

Special topics courses cover subjects not currently contained in the curriculum, but are designed to

address especially relevant trends or developments related to the discipline.

### **EMG 689 INDEPENDENT STUDY (1-3)**

Prerequisites: None

Independent Study allows students to explore academic areas of special interest not provided in the existing curriculum. It is carried out under the guidance of a member of the faculty.

### **EMG 690 CAPSTONE PROJECT (3)**

Prerequisites: None

Required: Department Chair approval, completion of 27 credit hours of the MSEM program, the nugget course not included.

During the last two trimesters of their training, students in the ITU Engineering Management Department must complete a capstone project or write a master's thesis. If the capstone project option is chosen, engineering management students are required to demonstrate their competence in the skills and knowledge associated with their degree program. It is designed to show the in-depth learning and higher-order thinking of the students. With this option, students must choose a project in the field of engineering management. Then they will plan, organize, implement, and work towards the completion of the project in a controlled manner, so as to meet the goals and objectives of their project. The capstone project is usually carried out by an individual student. Before beginning work, each capstone project must first be approved by an Engineering Management Faculty Advisor assigned by the Engineering Management Department Chair. At the end of the project, the student will prepare a Final Project Report and defend this work product before the Faculty Advisor and a panel of other assigned faculty members.

### **EMG 697 THESIS (3)**

Prerequisites: None

Required: Department Chair approval, completion of 27 credit hours of the MSEM program, the nugget course not included.

During the last two semesters of their training, students in the ITU Engineering Management Department must complete a capstone project or write a master's thesis. For the master thesis, the research must result in some new insights into the academic or practical concepts of the Engineering Management discipline. These must be fully analyzed, explained and documented in the thesis. If the Thesis Option is chosen, students must seek the assignment of an Engineering Management Faculty Advisor to guide their research on a topic in the field of engineering management. Additionally, the selection of a faculty advisor and the intended plan of study must be approved by the Engineering Management Department Chair. At the completion of the student's writing of the thesis, the student

will be required to orally defend the thesis before a committee assigned by the Engineering Management Department.

### **INTERNSHIP (INT)**

### **INT 593 P/F INTERNSHIP (1/3-3)**

Prerequisites: None

This course consists of participation in a full-time or part-time internship experience, related to the student's field of study under the supervision of both an approved internship provider and a faculty advisor. This course provides practical, hands-on training in a relevant industry to enhance classroom learning. A maximum of 10 credit hours earned in INT 593 may be applied toward the Master's Degree graduation requirements.

### **NUGGETS - IDS (INTERDISCIPLINARY SCIENCES)**

#### **IDS 550 ITU NUGGETS (CONSILIENCE “UNITY OF KNOWLEDGE” CONTENT) - (1/3-2)**

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## **FACULTY**

- Ramesh Konda, PhD** Computer Information, Nova Southeastern University Chair, Department of Business Administration and Engineering Management
- Aguilera, Frank, DBA**, Golden Gate University, Public Policy, Core Faculty and Assistance Chair, Business Administration and Engineering Management

## **CORE FACULTY**

- Alexander Peters, PhD** Civil Engineering, Aachen University of Technology Germany, Core Faculty.

## **ADJUNCT FACULTY**

- Yocoub Elziq, PhD** Electrical Engineering and Computer Engineering, Utah State University
- Venkatesh Gopal, PhD** BioTechnology, Anna University, Chennai India,
- John Kim, PhD** Electrical Engineering, New Mexico State University
- Bhairav Mehta, M.S.** Industrial and Systems Engineering, Rochester Institute of Technology; M.S. Applied Statistics/ Operations Research and MBA, Cornell University; MBA, Queen's University, Ontario, Canada
- Ammar Rayes, PhD** Electrical Engineering, Washington University St. Louis, Missouri
- Mamoun Samaha, PhD** Electrical Engineering, International Technological University, California
- Yuehjen Sun, PhD** Computer Science, University of Illinois
- Jeremy Tzeng, M.S. / Ph.D.** Electrical Engineering, University of California Berkeley

## INTERDISCIPLINARY SCIENCES

### PROGRAM DESCRIPTION

ITU's doctoral program in Interdisciplinary Sciences is a unique offering designed to develop consilience, an emerging study which seeks to unite the natural sciences with the social sciences. Reflecting ITU's mission to be on the cutting edge of innovation, this forward-looking program addresses an unfulfilled gap in university offerings that will only become wider in the future if not continuously explored.

### DOCTOR OF PHILOSOPHY IN INTERDISCIPLINARY SCIENCES

#### GENERAL REQUIREMENTS

Students must complete 60 credit hours to earn their degree

» 30 Credit Hours of Course Requirements

Or

PhD IS program allows up to 30 of the credits to be transferred or waived, according to the advanced standing students' previous learning or professional experiences. At least 6 credits of ITU regular courses are required before degree completion.

» 30 Credit Hours of Dissertation

#### PROGRAM REQUIREMENTS

##### Application:

For complete information, please refer to ITU's website: <https://www.itu.edu/academics/doctor-philosophy-interdisciplinary-sciences>

Exceptions may apply to select individuals upon Department Chair approval.

##### Thesis Advisor:

It is the student's responsibility to obtain consent from a full-time faculty member in the student's major department to serve as her/his prospective thesis advisor. Students are required to find a thesis advisor as soon as possible after being accepted as a Ph.D. student. The student and the thesis advisor jointly develop a complete program of study for research in a particular area. The complete program of study (and any subsequent changes) must be submitted to and approved by the

student's advisor.

#### Course Work and Study Program:

The students are expected to complete a minimum of 60 credit hours of graduate credit beyond the master's degree. Of these, 30 credit hours may be earned through coursework and independent study and 30 through the thesis. All thesis credit hours are graded on a Pass/No Pass basis. A maximum of 15 credit hours may be transferred from other accredited institutions at the discretion of the student's advisor.

#### Comprehensive Examinations:

After completion of the formal course work approved by the Doctoral Committee, the student shall request for comprehensive examination. The examination shall be a written exam representing sufficient preparation in depth and breadth for advanced research in the major. The comprehensive examinations normally must be completed within four years from the time of admission. Comprehensive examinations may be repeated only once, in whole or in proposed thesis topic, and determine any further changes to approving the research objective.

#### Thesis Research:

The period following the comprehensive examinations is devoted to research for the thesis, although such research may begin before the examinations are complete. After a research topic is approved by the Doctoral Committee, the students should conduct the thesis research toward the defined objective.

#### Publication:

One or more refereed articles based on the thesis research must be accepted for publication in a professional or scientific journal approved by the Doctoral Committee.

#### Thesis Defense:

The thesis must be made available to all examiners one month prior to the examination. The oral examination shall consist of a presentation of the results of the thesis and the defense. Thesis defense is open to all faculty members of the University, but only members of the Doctoral Committee have a vote.

#### Program Completion:

At least one month before the degree is to be

conferred, the candidate must submit to the Academic Quality Committee two copies of the final version of the thesis describing the research in its entirety. The candidate will submit the final draft of their thesis to ProQuest Dissertation Publishing. The Research Librarian is available to answer publication questions and assist students in this process. The thesis will not be considered as accepted until approved by the Doctoral Committee and publication acceptance. The University reserves the right to evaluate the undertakings and the accomplishments of the degree candidate in total, and award or withhold the degree as a result of its deliberations.

**Time Limit for Completing Degrees:**

All requirements for the doctoral degree must be completed within ten years following acceptance for the Ph.D. program. Extensions will be allowed only in unusual circumstances and must be approved in writing by the Committee on Graduate Programs.

**PREREQUISITE REQUIREMENTS**

All courses listing a prerequisite requirement can be petitioned by the student for waiver and evaluated by the Academic Committee on a case-by-case basis.

**PH.D. IN INTERDISCIPLINARY SCIENCES REQUIREMENTS**

The completion of at least 30 credit hours of graduate courses in the major field of study, and 30 credit hours of thesis includes:

**30 Credit Hours of Required Courses:**

- » IDS 711 General Consilience
- » IDS 712 Physics
- » IDS 713 Cosmology
- » IDS 714 Chemistry
- » IDS 715 Genetics
- » IDS 716 Evolution
- » IDS 717 Biology/Ecology
- » IDS 718 Evolutionary Neuroscience
- » IDS 719 Psychology
- » IDS 720 Philosophy

**30 Credit Hours of Thesis/Dissertation:**

- » IDS 901 Doctoral Dissertation

## **INTERNSHIPS**

In order to be competitive in today's economy, students must graduate with relevant work experience. Employers are looking for more seasoned employees who can add value from the start, so skill development is a key component of ITU's educational pedagogy. ITU places a strong emphasis on hands-on learning through internships, which link classroom learning to relevant industry experience. If you are an International Student, you must be in lawful F-1 status to be eligible to apply for an internship.

**Note:** Please refer to the Academic policy page for complete information about the Internship Policy

## **COURSES**

- » INT 593: Part-Time/Full-Time Internship

## COURSE DESCRIPTIONS

### **INT 593 PART-TIME/FULL-TIME INTERNSHIP**

**(1/3-3)**

Prerequisites: None

This course consists of participation in a full-time or part-time internship experience, related to the student's field of study under the supervision of both an approved internship provider and a faculty advisor. This course provides practical, hands-on training in a relevant industry to enhance classroom learning. A maximum of 10 credit hours earned in INT 593 may be applied toward the master's degree graduation requirements.

Nuggets - IDS (Interdisciplinary Sciences)

### **IDS 550 ITU NUGGETS (CONSILIENCE “UNITY OF KNOWLEDGE” CONTENT) - (1/3-2)**

No prerequisite is required for any Nugget course.

Nuggets are a modular course content, following all the same structured and quality assessment aspects of any ITU course, starting with only one-third of a

The Student Success Program has a required lab and materials fee which covers testing, textbooks and some other course expenses. This fee must be paid each trimester the student is enrolled. Students must complete a placement test prior to starting the program in order to properly assess their language development needs. The course runs the full length of the trimester.

**Department Chair:** Yau-Gene Chan

**Adjunct faculty:** Dr. Michelle Liang

## Supplementary Programs And Requirements

### CERTIFICATE PROGRAMS

Upon completing three of the approved enterprise resource planning courses with a grade of B or above, the student is awarded a joint student recognition award from ITU and SAP University alliance. To collect the certificate, the student should make the request after completing the three courses or while submitting their petition to graduate.

## STUDENT SUCCESS PROGRAM

The Student Success Program includes programming designed for both native and non-native English speakers that enable them to effectively communicate in both academically and professional contexts.

The program includes skill development in the following areas: library research, academic writing, giving presentations, interviewing, resume and cover letter writing, and reading comprehension. All students are welcome to join this program if their schedule permits. The program is offered during the day. Much of the program is conducted virtually so students don't have to worry about commute time and costs.

## CROSSWALK

NEW	OLD	COURSE TITLE	CREDIT HOURS
ACT 500	ACTN 900	Financial Accounting	3
ACT 501	ACTN 922	Forensic Accounting	3
ACT 502	ACTN 926	International Accounting	3
ACT 504	ACTN 927	Tax Accounting Principles	3
ACT 600	ACTN 910	Managerial Accounting	3
ACT 601	ACTN 920	Cost Accounting	3
ACT 602	ACTN 921	Intermediate Accounting	3
ACT 603	ACTN 925	Accounting Information Systems/ERP	3
ACT 604		Auditing	3
AMS 510	AMN 910	Linear Algebra	3
AMS 512	AMN 912	Applied Mathematic Methods	3
AMS 514	AMN 914	Fast Fourier Transformation & Applications	3
AMS 520	AMN 920	Optimization Techniques	3
AMS 530	AMN 930	Numerical Analysis	3
AMS 540	AMN 940	Discrete Mathematics	3
AMS 552	AMN 952	Probability, Statistics, and Reliability for Engineers	3
AMS 722	AMN 922	Advanced Applied Mathematics Methods	3

AMS 750		Abstract Algebra	3
AMS 760	AMN 960	Advanced Optimization Techniques	3
BIO 500	BIOM 900	Clinical Research Management	3
BIO 501	BIOM 901	Modern Medicine and Biology	3
BIO 506	BIOM 909	Biotech Industry Fundamentals	3
BIO 510		Ethics in Medical Research	3
BUA 500		Principles of Business Analytics	3
BUA 501		Quantitative Analysis	3
BUA 502		BUA 502 Introduction to Data Analysis	3
BUA 503		Game Theory, Business Strategy, and Thinking Strategically	3
BUA 504		Data Warehousing and Visualization	3
BUA 505		Predictive Analytics for Business Strategy	3
BUA 506		Developing Value Through Business Analysis Applications	3
BUA 507		Ethical Business Decision-Making	3
BUA 508		Risk Analytics	3
BUA 509		Web Analytics	3
BUA 510		Data Science Applications with R or Python	3
BUA 511		Data Visualization and interpretation using Tableau	3

BUA 512		Business Cognitive Analytics and Applications	3	BUS 688		Special Topics	1-3
BUA 513		Financial Engineering: Computational and Quantitative Methods	3	BUS 689		Independent Study	1-3
BUA 690		Simulation and Optimization for Business Analytics	3	BUS 690		Strategic Management and Business Policy	3
NEW	OLD	COURSE TITLE	CREDIT HOURS	BUS 700	DBA 810	Behavioral Marketing, Digitization, and Decision Making	3
BUS 500	PMGT 900	Project Management Frameworks	3	BUS 701		Innovation in Business Transformation and Entrepreneurship	3
BUS 501	PMGT 901	Strategic Planning & Portfolio Management	3	BUS 710	DBA 822	Special Interest Seminars and/or Conferences	0
BUS 502	PMGT 904	Project Management & Leadership	3	BUS 711		CCP Panel Presentation I	0
BUS 503	PMGT 905	Project Management - Agile Approach	3	BUS 713	DBA 825	Multinational Business Finance	3
BUS 504	PMGT 911	Contract Management & Financial Planning	3	BUS 800	DBA 900	Quantitative Research Analysis I	3
BUS 506		Process Mapping & Control	3	BUS 801	DBA 901	Quantitative Research Analysis II	3
BUS 509	EBUS 917	Leading and Managing Change	3	BUS 802	DBA 902	Qualitative Research Analysis I	3
BUS 510	EBUS 918	Regulation, Governance, Ethical and Social Responsibility	3	BUS 803		Qualitative Research Analysis II	3
BUS 516	INMG 910	Principles of Quality Management	3	BUS 804	DBA 911	Data Analytics I	3
BUS 517		Organization Culture and Diversity	3	BUS 805		Data Analytics II	3
BUS 518		Applied Statistics	3	BUS 806		Peregrine APA Write & Cite	0
BUS 520		Emerging Technologies for Product Development	3	BUS 810		Financial Engineering and Innovation	3
BUS 521		Management of Technology and Innovation	3	BUS 811		Innovation and Digital Transformation	3
BUS 600	MBAN 997	Research Methods	3	BUS 812		Strategy for Disruptive Innovation	3
				BUS 813		CCP Panel Presentation II	0

BUS 820		Theoretical Frameworks in Strategy Research	3	CEN 699	CEN 999	Master Thesis Research II	3
BUS 821		Research Design	3	CSC 501		Discrete Structures	3
BUS 822		CCP final panel presentation	0	CSC 502		Principles of OS & Distributed Systems	3
BUS 901	DBA 990	Doctoral Capstone Research 1	1-9	CSC 505	SEN 933	The UNIX/Linux OS	3
BUS 902		Doctoral Capstone Project 1	1-9	CSC 509	CS 880	C Programming	3
BUS 903		Doctoral Capstone Publishable Papers	1-9	CSC 511	SEN 909	OO Programming With C++	3
NEW	OLD	COURSE TITLE	CREDIT HOURS	CSC 512	SEN 890	Data Structures	3
CEN 508	CEN 908	Scientific Computing	3	CSC 515	SEN 965	iPhone Application Development	3
CEN 540	CEN 940	Network Security Techniques	3	CSC 518	SEN 964	OO Programming with Java	3
CEN 542	CEN 942	Digital Image Processing	3	CSC 519	SEN 958	Android Phone Application Development	3
CEN 548	CEN 948	Computer Network Systems	3	CSC 520	SEN 963	Python Programming	3
CEN 551	CEN 951	Computer Architecture	3	CSC 522	CS 860	R Language Programming	3
CEN 556	CEN 956	Distributed Computing Systems	3	CSC 525	SEN 910	HTML/CSS Programming	3
CEN 557		Data Science and Technology	3	CSC 527		Mobile Web Programming	3
CEN 565	CEN 965	Introduction to Medical Image Systems	3	CSC 530	SEN 949	JavaScript Programming	3
CEN 581	CEN 981	Principle of Internet of Things	3	CSC 532	SEN 951	Client Programming with JS/jQuery	3
CEN 653		Challenge of Edge Device Design	3	CSC 535	SEN 954	Server Programming with PHP	3
CEN 688	CEN 680, CEN 992	Special Topics	1-3	CSC 545		Programming in Go	3
CEN 689		Independent Study	1-3	CSC 550	CS 850	Big Data	3
CEN 698	CEN 999	Master Thesis I	3	CSC 555		Bio Informatics	3
				CSC 560	CS 960	Introduction to Data Science	3

CSC 580	SEN 920	Computer Algorithms	3	CSC 750	CS 910	Coding Theory	3
CSC 610	SEN 953	Ruby on Rails	3	DGA 501	MMM 905	New Media Production	3
CSC 615		Angular JS	3	DGA 503	MMM 910	Storyboard Design	3
CSC 620	CS 923	Programming Language Theory	3	DGA 504	MMM 820	Global Storytelling	3
NEW	OLD	COURSE TITLE	CREDIT HOURS	DGA 507	MMM 830	Design Fundamentals	3
CSC 625		Advanced HTML5	3	DGA 508	MMM 831	CG Software Fundamentals	3
CSC 631	CS 831	Data Mining	3	DGA 509	MMM 870	Basic Image Manipulation	3
CSC 630		Scala Programming	3	DGA 510	MMM 909	Intro to Game Development	3
CSC 633	CS 933	Machine Learning	3	DGA 511	MMM 810	General Production Pipelines	3
CSC 640		Artificial Intelligence	3	DGA 512	MMM 911	Web Graphic Design	3
CSC 650		Big Data Analytics (CPO-SAS/SPSS)	3	DGA 513	MMM 800	Documentary Production	3
CSC 660		Advanced Data Science	3	DGA 515	MMM 904	Sound Design	3
CSC 670	CS 901	Network & Data Security	3	DGA 516		Production Sound Recording	3
CSC 680	CS 950	Advanced Computer Algorithms	3	DGA 517		Post Production Sound Recording	3
CSC 682	SEN 921	Graph Algorithms	3	DGA 518	MMM 920	UI/UX: User Interfaces & User Experiences	3
CSC 688		Special Topics	3	DGA 519		Still Life & Figure Drawing	3
CSC 689		Independent Study	3	DGA 520		Motion Graphics	3
CSC 690	SEN 998	Capstone Project	3	DGA 521	MMM 710	Digital Media Distribution	3
CSC 695	SEN 999	Master's Thesis	3-6	DGA 522	MMM 823	Editing I	3
CSC 720		Formal Methods	3	DGA 523	MMM 890	Social Network Marketing & Publishing	3
CSC 730	CS 979	Cryptography & Cryptanalysis	3	DGA 524		Virtual Reality/ Augmented Reality	3

DGA 526		Screenwriting	3	DGA 621	MMM 720	Producing Digital Media	3
DGA 527		Production	3	DGA 622	MMM 824	Editing II	3
NEW	OLD	COURSE TITLE	CREDIT HOURS	DGA 626	MMM 916	Animation II	3
DGA 528		Dynamic UX	3	DGA 631	MMM 900	Digital Media Startup	3
DGA 529		Introduction to Games Programming Unity, SpriteKit using C#, and Swift	3	DGA 641		Augmented Reality Design and Production	3
DGA 531		Beginning Augmented Reality	3	DGA 642		Virtual Reality Design and Production	3
DGA 532		Beginning Virtual Reality	3	DGA 661		Unity 2D/3D Game Development Platform	3
DGA 533		Artist Representation	3	NEW	OLD	COURSE TITLE	CREDIT HOURS
DGA 534		Production Management	3	DGA 688		Special Topics	1-3
DGA 535		Business of Entertainment	3	DGA 689		Independent Study	1-3
DGA 536		Originating and Development Ideas for Entertainment	3	DGA 690	MMM 999	Master's Project	3
DGA 606	MMM 903	Animation I	3	DGA 692		Master's Thesis	3
DGA 607	MMM 921	Storyboards and Layouts	3	ECE 500	EEN 500/CEN 500	Electrical and Computer Engineering	3
DGA 608	MMM 860	CG Modeling	3	ECE 502		Advanced Python Applications	3
DGA 609	MMM 923	3D Modeling and 3D Printing	3	ECE 503		AI Math fundamentals with Python application	3
DGA 610	MMM 931	Rigging for 3D Animation	3	ECE 504		Operating system design and implementation	3
DGA 611	MMM 950	Lighting and Compositing	3	ECE 505		Machine Learning Fundamentals	3
DGA 612	MMM 988	Concept Art and Storyboarding	3	ECE 510	CEN 510	Algorithms and Data Analysis	3
DGA 615		ZBrush	3	ECE 610		Algorithm on a Chip	3
DGA 617		Motion Capture	3				

ECE 646		IoT System Design	3			Economics of Strategy and Managerial Decision Making	3
ECE 655		Deep Learning Fundamentals	3			Financial Crisis – History	3
ECE 656		Reinforcement Learning (Pytorch)	3			Behavioral Economics	3
ECE 657		Natural Language Processing (Keras/ TensorFlow 2.0, Pytorch)	3			Economic of Financial Markets	3
ECE 660		Parallel Implementation of ML Algorithms with GPUs	3			Economic of Emerging Markets	3
ECE 661		AI application development in Engineering and	3			Fundamentals of The Real World Economy	3
ECE 662		662 AI application development in business	3		EEN 500	EEN 900	Electrical Engineering (Up to Summer 2018)
ECE 663		Machine Learning project deployment and production	3		EEN 511	EEN 911	Integrated Circuit Design
NEW	OLD	COURSE TITLE	CREDIT HOURS		EEN 513	EEN 913	Microprocessor Design
ECE 688		Special Topics in Computer Engineering	1-3		EEN 520	EEN 920	ASIC Design I
ECE 689		Independent Study	1-3		EEN 521	EEN 921	AI Design Using FPGA
ECE 698		Master Thesis	3		EEN 525	EEN 925	ASIC Design II
ECE 500		Principles of Economics	3		EEN 541	EEN 941	Digital Signal Processing and System Analysis
ECN 501		Principles of Microeconomics	3		EEN 616	EEN 916	Mixed Signal IC Design
ECN 502		Principles of Economic Uncertainty and Complexity	3		EEN 618	EEN 918	Analog and RF IC Design
ECN 503		Fundamentals of Economic Development	3		EEN 627	EEN 927	Capstone Course 2 - Chip Design to Silicon
ECN 504		Economics of Business	3		NEW	OLD	COURSE TITLE
							CREDIT HOURS
					EEN 629	EEN 929	System on Chip (SOC) Design
					EEN 630		Quantum Design and Systems

EEN 635	EEN 935	Introduction to MEMS Design	3		EMG 500	EM 900	Principles of Engineering Management	3
EEN 671	EEN 971	Introduction to Wireless Communication Systems	3		EMG 501	EM 901	Engineering Project Management (Formerly: Engineering Practicum)	3
EEN 688	EEN 680, EEN 992	Special Topics	3		EMG 502		Organizational Management	3
EEN 689		Independent Study	1-3		EMG 503		Product Management	3
EEN 698	EEN 999	Master Thesis I	3		EMG 504		Blockchain Fundamentals for Engineering Managers	3
EEN 699	EEN 999	Master Thesis II	3		EMG 505		Data Engineering for Engineering Managers	3
EEN 715		Advanced Computer Architecture	3		EMG 506		Systems Engineering and Architecture	3
EEN 717	EEN 917	Advanced Analog IC Design	3		EMG 507		Operations Research	3
EEN 733		Advanced Computing Technology	3		EMG 510		Mobile Applications and IoT Development for Entrepreneurs	3
EEN 736	EEN 936	Advanced Sensor/Bio Design	3		EMG 511		Technology Management and Entrepreneurship	3
EEN 739		Advanced Bioelectronics and Bioengineering	3		EMG 522		Fundamentals of Business Analysis for Software Development	3
EEN 749	EEN 949	Advanced Digital Signal Processing	3		EMG 528		AI Technology Management	3
EEN 753	EEN 953	Advanced Machine Learning Engineering	3		EMG 529		Machine Learning for Engineering Managers	3
EEN 758	EEN 958	Advanced System Design	3		EMG 530		Regulatory Affairs for Medical Devices	3
EEN 766	EEN 966	Advanced Communication Systems	3		EMG 540		Writing and Presentation Skill-Building for Engineering Managers	3
EEN 774	EEN 974	Advanced Wireless Communications	3		EMG 545		Introduction to Medical Devices and Digital Health Products	3
EEN 891	EEN 996	Independent Study	1-6					
EEN 907	EEN 999	Doctoral Dissertation Research	3-9					

EMG 549		Introduction to Software Development & Business Architecture for Engineering Managers	3	EMG 688	EMG 580	Special Topics	1-3
				EMG 689		Independent Study	1-3
				EMG 690		Capstone Project	3
EMG 550		Software QA and Testing for Business Analysts	3	EMG 697		Thesis	3
				ERP 509	ERP 901	Introduction to ERP Systems Using SAP	3
				ERP 510	ERP 902	ABAP - Advanced Business Application Programming	3
EMG 551		Agile Methodologies	3	ERP 511	ERP 905	Enterprise Portal Technology Using NetWeaver	3
				ERP 512	ERP 907	Enterprise Procurement Processes (MM)	3
				ERP 513	ERP 912	Sales Order Management With ERP	3
EMG 552		DevOps and Microservices Architecture	3	FIN 515	FINN 933	Managerial Finance	3
				FIN 516	FINN 996	Entrepreneurial Finance	3
				FIN 517	FINN 918	Financial Institutions	3
EMG 553		Business Technology Strategy	3	FIN 518	FINN 921	Financial and Socially Responsible Investing	3
				FIN 519	FINN 922	Corporate Valuation	3
				FIN 520	FINN 930	Investment Management	3
NEW	OLD	COURSE TITLE	CREDIT HOURS	FIN 521	FINN 931	International Financial Management	3
				FIN 522	FINN 936	Behavioral Finance	3
				FIN 523	ECON 920	Macroeconomic Theory	3
EMG 554		Management Consulting	3	FIN 525	ECON 922	Econometrics	3
				FIN 526	ECON 923	International Economics	3
EMG 557		Internet of Things (IoT) Management Issues	3				
EMG 559		Introduction to Sensor Technology for Engineering Managers	3				
EMG 560		Cybersecurity Management	3				
EMG 563		Introduction to Intellectual Property Management	3				
EMG 564		Quantitative Analysis for Engineering Managers	3				
EMG 565		Healthcare Product Economics and Outcomes	3				
EMG 568		Technology Management	3				
EMG 570		Cloud Computing Management	3				
EMG 574		Physics for Engineering Managers	3				
EMG 579		Business Process Management	3				

FIN 534	FINN 934	Financial and Economic Analysis	3		HCM 537		Commercializing Medical Devices, Diagnostics and Biomedical Innovations	3
FIN 604		Securities Analysis	3		HCM 538		Predictive Analytics and Decision Models in Healthcare	3
FIN 605	FINN 920	Financial Derivatives and Risk Management	3		HCM 539		Healthcare Marketing	3
FIN 606	FINN 932	Corporate Finance	3		HCM 690		Healthcare Innovation Management Project	3
FIN 607	FINN 935	Mergers and Acquisitions	3		HRM 528	HRMG 940	Human Resource Management	3
HCM 509		Scientific Writing and Research for Healthcare	3		HRM 529	HRMG 941	Employee Training And Development	3
HCM 510	BPS 821	A Regulatory Overview & Compliance	3		HRM 530	HRMG 942	Employment Law For Business	3
HCM 511	HCM 901	Concepts of Healthcare Management	3		HRM 532		Managing Human Capital using SAP HCM	3
NEW	OLD	COURSE TITLE	CREDIT HOURS		HRM 533	HRMG 945	Strategic Compensation: Issues and Opportunities	3
HCM 513	HCM 904	Innovating Biomedical Technology	3		HRM 535	HRMG 946	Human Resources and Information Technology using SAP HCM (Formerly: Human Resources and Information Technology)	3
HCM 515	HCM 906	Health Information Technology	3		ICS 501		Introduction to Cybersecurity	3
HCM 519	HCM 911	Healthcare Ethics	3		ICS 502		Cyber Attack Countermeasures	3
HCM 520	HCM 912	Healthcare Leadership, Patient Safety and Quality Improvement	3		ICS 520		Personal Computer Security	3
HCM 525	HCM 921	Principles of Managed Care	3		ICS 525		Principles of Ethical Hacking	
HCM 529	HCM 930	Mental Health and Wellbeing	3		ICS 530		Cloud Computing Security	3
HCM 531	HCM 933	Complementary and Alternative Medicine	3		ICS 535		Cloud and Virtualization Security (CPO)	3
HCM 534		Financial Management for Healthcare Organization	3					
HCM 535		Data Analytics Applications in Healthcare	3					
HCM 536		High Reliability Healthcare Organizations	3					

ICS 550		Security Policies	3	IDS 901		Doctoral Dissertation	1-9
ICS 570		Web Security Fundamentals	3	INB 553	INBS 910	Fundamentals of International Business	3
ICS 601		Advanced Cybersecurity	3	INB 554	INBS 911	International Financial Markets	3
ICS 620		Computer Malware	3	INB 556	INBS 913	Global Strategic Management	3
ICS 630		Digital Forensics Technology	3	INB 558	INBS 916	Global Marketing and Strategy	3
ICS 670		Network & Data Security	3	INT 593F	GRN 900F	Internship	3
ICS 680		Theory of Cryptographic Systems	3	INT 593P	GRN 900P	Internship	1
ICS 688		Special Topics	3	MBN 697	MBAN 999	MBA Thesis	3
ICS 690		Capstone Project	3	MGT 503	MGTN 903	Organizational Leadership Theories	3
ICS 695		Master's Thesis	3	MGT 560	MGTN 901	Principles of Management	3
IDS 711	CONS 901	General Consilience	3	MGT 561		Coaching – Changing Lives, Changing Organizations	3
IDS 712	CONS 902	Physics	3	MGT 564	MGTN 916	Principles of Public Relations	3
IDS 713	CONS 903	Cosmology	3	MGT 566	MGTN 920	Production and Operations Management	3
NEW	OLD	COURSE TITLE	CREDIT HOURS	MGT 567	MGTN 922	Quality Control Management	3
IDS 714	CONS 904	Chemistry	3	MGT 568		Impact of Intellectual Property In a Global Economy	3
IDS 715	CONS 905	Genetics	3	MGT 569	MGTN 930	Strategic Operations Management	3
IDS 716	CONS 906	Evolution	3	MGT 571	MGTN 942	Critical Thinking Strategies in Decision Making	3
IDS 717	CONS 907	Biology/Ecology	3	MGT 572	MGTN 943	High-Technology Entrepreneurship	3
IDS 718	CONS 908	Evolutionary Neuroscience	3	MGT 573	MGTN 944	International Management	3
IDS 719	CONS 909	Psychology	3				
IDS 720	CONS 910	Philosophy	3				
IDS 891		Independent Study	1-6				

MGT 575	MGTN 948	Project Management	3		MIS 538	MISY 910	Business Database Applications	3
MGT 576		Organizational Theory	3		MIS 539	MISY 911	Business Telecommunications	3
MGT 577	MGTN 950	Project Risk Management	3		MIS 540	MISY 912	Information Resource Management	3
MGT 578	MGTN 951	Business Communications	3		MIS 541	MISY 913	Managing Global Information Systems Projects	3
MGT 579	MGTN 952	Business Ethics	3		MIS 542	MISY 914	Information Systems Innovation	3
MGT 580	MGTN 953	Business Law	3		MIS 543	MISY 916	Human-Computer Interaction	3
MGT 581	MGTN 966	Managing Emotions, Managing Self and Others	3		MIS 544	MISY 917	Business Decision Support Systems	3
MGT 582		Team and Group Dynamics	3		MIS 545	MISY 918	Data Mining and Business Intelligence using SAP (Formerly: Data Mining and Business Intelligence)	3
MGT 583		Global Entrepreneurship and Innovation	3		MIS 546	MISY 919	Data Science for Business	3
MGT 584	MKTN 952	Supply Chain Management	3		MIS 547	MISY 920	Software Development Process Management	3
MGT 593		Intrapreneurship - Innovation From Within	3		MIS 548	MISY 921	Knowledge Management	3
MGT 608	MGTN 902	Business Statistics	3		MKT 551	MKTN 951	Competitive Marketing Strategies	3
MGT 611	MGTN 923	Lean Six Sigma	3		MKT 582	MKTN 958	Marketing Management	3
NEW	OLD	COURSE TITLE	CREDIT HOURS		MKT 583	MKTN 950	Entrepreneurial Marketing	3
MGT 612	MGTN 954	Advanced Project Management	3		MKT 585	MKTN 953	International Marketing	3
MGT 690	MGTN 945	Pitching a Business Plan to Venture Capitalists	3		MKT 586	MKTN 954	Marketing Research	3
MIS 527	MISY 927	Technology and Operations Management: Creating Value	3		MKT 587		Comparative Studies of MNC, FDI, and International Trade	3
MIS 537	MISY 915	Management Information Systems	3		MKT 588	MKTN 957	Consumer Behavior	3

MKT 589	MKTN 961	E-Commerce	3		SWE 570		Internet of Things Architecture and Security	3
MKT 590	MKTN 962	Marketing With Social Media	3		SWE 600	SEN 942	Advanced Software Engineering	3
MKT 591	MKTN 963	Advertising Strategy	3		SWE 602	SEN 946	Software Requirements Elicitation	3
MKT 592	MKTN 965	Supplier/Seller Management	3		SWE 632		Software Risk Management	3
MKT 593		Marketing with Digital Perspectives using SAP CRM	3		SWE 633	SEN 944	Software Refactoring	3
MKT 613	MKTN 959	Advanced Marketing	3		SWE 680	SEN 950	Software Architecture	3
SWE 500	SEN 941	Software Engineering	3		SWE 688		Special Topics	3
SWE 518		User Interface Design & Implementation	3		SWE 689		Independent Study	3
SWE 525		Version Control Tools/ git	3		SWE 690	SEN 998	Capstone Project	3
SWE 540	SEN 760	SQA/Manual Testing	3		SWE 695	SEN 999	Capstone Thesis	3-6
SWE 542	SEN 860	SQA/Manual/Auto/Perf Testing	3					
SWE 544	SEN 930	SQA/Software Testing Tools	3					
SWE 546		SQA/Performance Testing	3					
SWE 550		Software Project Management (CPO- ACP)						
SWE 560	SEN 934	Principle of Database Systems	3					
SWE 561	SEN 961	Cloud Computing	3					
SWE 562	SEN 982	Oracle Database Management/ Administration	3					
NEW	OLD	COURSE TITLE	CREDIT HOURS					
SWE 565		Blockchain System	3					