



جامعة خليفة
Khalifa University



ACADEMIC 18
CATALOG 19

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 جامعة خليفة
Khalifa University

PROVOST'S MESSAGE



Welcome to Khalifa University, where you will spend the next few years of your journey through education.

High-quality education is an important prerequisite towards understanding and addressing societal challenges relating to energy, environment, healthcare, security, communications, transportation and civil infrastructure, amongst others.

The diverse community of scholars at Khalifa University will help prepare you to face these challenges and to make your unique contribution to the solutions demanded by them. Beyond a high-quality grounding in your chosen subject area, you will also need a variety of other attributes to succeed as a leader, including the ability to communicate and to work in teams, competence in working within economic and societal constraints, a sense of professional and personal ethics, managerial and business acumen and the interest and capacity to serve others. We are dedicated to helping you develop and refine all of these skills.

Our University is a dynamic institution offering high quality education and practical experience. We strive to create a learning culture that exemplifies excellence in teaching and scholarship, which promotes lifelong learning and prepares individuals for leadership and service in the global society. We have the responsibility to help you develop as complete and well-rounded individuals and maximize your potential to pursue careers with passion and purpose.

We offer a diverse range of degree programs that are designed to meet the criteria set by national and international accreditation bodies. Our faculty and staff are highly qualified, experienced and dedicated professionals, who are always willing to impart their knowledge and experience to our students. The University has world-class facilities which will make your learning experience productive and enjoyable.

This Catalog provides you with information to make your academic planning easier. Decisions about

majors, specializations and courses require careful consideration, and the Catalog will help you plan your degree from your first year through to your final year. If you need more information or advice, please take advantage of the professional expertise of our faculty and administrative staff. Your academic advisor will be happy to give you the appropriate advice.

I look forward to meeting you and to sharing the great adventure of university life with you and the rest of our community. I believe you will find Khalifa University to be a stimulating and supportive environment in which to shape your future.

Dr. Bayan Sharif
Acting Provost, Khalifa University

ACADEMIC CALENDAR

FALL SEMESTER 2018

DAY	DATE	EVENT
Tuesday	21-Aug	Arafat Day
Wednesday to Thursday	22-23 Aug	Eid Al Adha
Sunday	26-Aug	Faculty reporting - New Student Orientation
Sunday - Monday	26-27 Aug	New student orientation
Tuesday	28-Aug	Classes begin - Fall
Monday	3-Sep	End of add/drop for UG
Thursday	6-Sep	End of add/drop for PG
Tuesday	11-Sep	Hijri New Year
Monday	22-Oct	Mid Grade Due Date
Sunday to Thursday	4-8 Nov	Advisement Period for Spring 2019
Thursday	8-Nov	Last Day to withdraw with a grade of "W"
Sunday to Thursday	11-15 Nov	Early Registration for Spring 2019
Tuesday	20-Nov	Prophet's Birthday
Friday	30-Nov	Martyr's Day
Sunday - Monday	2-3 Dec	National Day
Tuesday	11-Dec	Last day of classes
Thursday	13-Dec	Final exams begin
Thursday	20-Dec	Final exams end
Thursday	20-Dec	Final thesis submission
Sunday	23-Dec	Fall Break begins
Tuesday	25-Dec	Final Grades due

SPRING SEMESTER 2019

DAY	DATE	EVENT
Sunday	6-Jan	Faculty reporting
Tuesday - Wednesday	8-9 Jan	New student orientation
Sunday	13-Jan	Classes begin - Spring
Thursday	17-Jan	End of add/drop UG
Tuesday	22-Jan	End of add/drop PG
Monday	11-Mar	Mid Grade Due Date
Sunday - Thursday	24-28 March	Spring Break (both days inclusive)
Sunday	31-Mar	Classes Resume

Sunday - Thursday	31 March - 4 April	Advisement Period for Sum/Fall 2019
Wednesday	3-Apr	Isra Wal Miraj
Thursday	4-Apr	Last Day to withdraw with a grade of "W"
Sunday - Thursday	7-11 April	Early Registration for Sum/Fall 2019
Thursday	2-May	Last day of classes
Sunday	5-May	Final exams begin
Monday	13-May	Final exams end
Monday	13-May	Final thesis submission
Thursday	16-May	Final Grades due

SUMMER SEMESTER 2019

DAY	DATE	EVENT
Sunday	26-May	Classes begin - Summer
Sunday	26-May	Internships begin
Monday	27-May	End of add/drop for UG/PG
Tuesday to Thursday	4-6 June	Eid El Fitr
Wednesday	19-Jun	Mid Grade Due Date
Wednesday	26-Jun	Last Day to withdraw with a grade of "W"
Tuesday	9-Jul	Last day of classes
Wednesday	10-Jul	Final exams begin
Thursday	11-Jul	Final thesis submission
Saturday	13-Jul	Final exams end
Tuesday	16-Jul	Final Grades due
Tuesday	23-Jul	Internship Ends

FALL SEMESTER 2019

Proposed Term Start Date:
August 25, 2019

NOTES:

The above dates are subject to change. In the event of any changes, an official notification will be sent by the Office of Academic & Student Services.

Islamic holidays are determined after sighting the moon. Thus, actual dates may not coincide with the dates in this calendar. In the event of loss of teaching days due to unscheduled closings, the semester(s) may be extended or Saturday classes may be required.

EMAIL DIRECTORY

Admissions	admission@kustar.ac.ae
Aerospace Engineering	aerospace@kustar.ac.ae
ANKABUT	ankabut@kustar.ac.ae
Applied Mathematics and Science	ams@kustar.ac.ae
Associate Dean for Graduate Studies	adean_pg@kustar.ac.ae
Associate Dean for Undergraduate Studies	adean_ug@kustar.ac.ae
Banner Procurement	Banner.procurement@kustar.ac.ae
Biomedical Engineering	biomedical@kustar.ac.ae
Career and Counseling Services	careercs@kustar.ac.ae
Career Development Center	internships@kustar.ac.ae
Career fairs	careerfairs@kustar.ac.ae
Civil Engineering	civil@kustar.ac.ae
Cleaning Services AUH	cleaning.services@kustar.ac.ae
College of Engineering Communication	cengg_comm@kustar.ac.ae
College of Arts and Science Communication	cos_comm@kustar.ac.ae
Community Service Unit	csu@kustar.ac.ae
Counseling Services	counseling.services@kustar.ac.ae
Electrical and Computer Engineering	ece@kustar.ac.ae
Facilities Management Department	FMD@kustar.ac.ae
Finance and Budget Department	kufbd@kustar.ac.ae
FM Support	fmsupport@kustar.ac.ae
General Counsel	general.counsel@kustar.ac.ae
Government Relations	KUGovernmentRelations@kustar.ac.ae
Graduate Studies Office	gso@kustar.ac.ae
Humanities and Social Sciences	hss@kustar.ac.ae
Industrial and Systems Engineering	industrial@kustar.ac.ae
Information	information@kustar.ac.ae
International and Civil Security	IICS@kustar.ac.ae
IT Help Desk	ithelpdesk@kustar.ac.ae
Khalifa Semiconductor Research Center	KSRC@kustar.ac.ae
Khalifa University Information Desk	info@kustar.ac.ae; info@ku.ac.ae
Khalifa University Communications	ucomm@kustar.ac.ae
Khalifa University Contracts	contracts@kustar.ac.ae
Khalifa University Events	events@kustar.ac.ae
Khalifa University Procurement	procurement@kustar.ac.ae
Khalifa University Blog	blog@kustar.ac.ae
Khalifa University Travel Desk	travel.desk@kustar.ac.ae
Khalifa University EVP Office	OfficeofTheEVP@kustar.ac.ae
Khalifa University Accommodation	accommodation@kustar.ac.ae

Khalifa University Library	library@kustar.ac.ae
Library Services	libse@kustar.ac.ae
Mechanical Engineering	mechanical@kustar.ac.ae
Office of Alumni Relations	alumni@kustar.ac.ae
Office of Human Resources	HRServices@kustar.ac.ae
Office of International Education	oie@kustar.ac.ae
Office of Research Support	ORS@kustar.ac.ae
Office of the Dean of Engineering	DeanOffice@kustar.ac.ae
Office of the Dean of Arts and Science	
Office of the Interim VP of HR and	IntVP.HRProcurement@ku.ac.ae
Procurement Office of the President	presidents.office@ku.ac.ae
Office of the Provost	Provost.Office@kustar.ac.ae
Office of the Senior Vice President for Research and Development	Office.SVPRD@kustar.ac.ae
Payroll	payroll@kustar.ac.ae
Postgraduate Admissions	pgadmission@kustar.ac.ae
Postgraduate Studies	pgs01@kustar.ac.ae
Recruitment Support	Recruitment.Support@kustar.ac.ae
Registration Office	registration.office@kustar.ac.ae
Scholarship Unit	scholarship.unit@kustar.ac.ae
student employment	studentemployment@kustar.ac.ae
Student Incident Reporting System	guard@kustar.ac.ae
Student Services	staf@kustar.ac.ae
Student Services Help	Stdsrv.Help@kustar.ac.ae
Students Events	student.services@kustar.ac.ae
Students Recruitment and Admission Office	admissions@kustar.ac.ae
The Graduate School	gradschool@ku.ac.ae
The Recruitment Team	recruitment@kustar.ac.ae
University Laboratories	kulabs@kustar.ac.ae
VPSS Office	VPSS.Office@kustar.ac.ae

STUDENT CATALOG OF RECORD

The Khalifa University of Science and Technology Undergraduate Course Catalog is intended for students of the University who are entering the Fall 2018 term, either as students in its Undergraduate Degree Programs or its Preparatory Program.



THE UNIVERSITY

MERGER OF CONSTITUENT INSTITUTIONS

Emiri Decree of 15 February 2017, issued by President His Highness Sheikh Khalifa bin Zayed Al Nahyan, in his capacity as Ruler of Abu Dhabi, officially merged Khalifa University of Science, Technology and Research (KUSTAR), Masdar Institute of Science and Technology (MI), and The Petroleum Institute (PI), into a single, world-class university. The new university established under this law was named Khalifa University of Science and Technology.

As per the decree, the resulting university:
...aims to foster advancement, development and scientific research by offering higher education programs and conducting scientific research in a manner which ensures the realization of academic and research excellence at the national, regional and international levels, as well as complementing the society with qualified cadres in accordance with the legislations in force...

Khalifa University of Science and Technology has three purpose-built campuses; one on Abu Dhabi Island, called the Main Campus, where the central administration for the University is located and all general education courses are taught; a second in Masdar City near Abu Dhabi International Airport; and a third in Sas Al Nakhl, near the Maqta Bridge.

The University offers a variety of Bachelor's, Master's and Doctorate programs, with the common feature of having a scientific and technological focus. The core of the institutional mission of each program is to provide high-quality education to the citizens of the UAE and global community at large.

The main goals of Khalifa University of Science and Technology are to support development and progress, marshal resources and capabilities to strengthen scientific research activities and to achieve world-class academic and research excellence locally, regionally and internationally. The new unified university will also contribute to enriching society with well-educated qualified human capital.

In the new merged University, Masdar Institute (MI) and the Petroleum Institute (PI) continue to represent flagship research institutes which provide opportunities for faculty and students to engage in advanced scholarship.

The histories of the three merged universities are integral to the vision and mission of the unified university. KUSTAR was inaugurated on 13 February 2007 by the President of the UAE, His Highness Sheikh Khalifa bin Zayed Al Nahyan, and had in its remit to provide Bachelor's, Master's and Doctoral level education primarily in engineering and the sciences. The university opened its Abu Dhabi campus in October 2008, to add to the campus in Sharjah (formerly Etisalat University College, EUC). The Sharjah branch campus (since closed) had a very proud history that stretched back to 1989.

MI was established by the Abu Dhabi leadership in 2007 as an independent research university in response to the goals stated in the Abu Dhabi Vision 2030, and the broader strategies of the UAE. The institute was intended to develop homegrown research and development capacity in Abu Dhabi and to provide the human and intellectual capital in support of the emirate's sustainable and innovative industries. MI's curricula and research programs were established in collaboration with the Massachusetts Institute of Technology (MIT), which remained its primary academic collaborator.

The PI was established in 2000 by Emiri decree. The institute was financed and governed by a consortium of five major oil companies: ADNOC, Royal Dutch Shell, BP, Total S.A., and Japan Oil Development Company, a wholly owned subsidiary of INPEX. The PI admitted its first students in the Fall of 2001 and offered Bachelor's and Master's level programs as well as a research program tailored to the needs of the oil and gas industry. The purpose of the PI, as part of Khalifa University of Science and Technology, will continue to provide highly-trained engineers and geoscientists for the UAE oil, gas and broader energy industries.

UNIVERSITY VISION AND GOALS

The vision of the Khalifa University of Science and Technology is:

To be a catalyst for the growth of Abu Dhabi and the UAE's rapidly developing knowledge economy, the engineering and science education destination of choice, and a global leader among research intensive universities in the 21st century.

Strategic Priorities

Khalifa University of Science and Technology has identified the following key strategic priorities:



World-Class Education :

prepare future leaders to an internationally recognized standard.



Influential Research :

produce world-class research with local relevance and international impact.



Catalyst for Economic Development :

enrich the national economy through innovation and research commercialization.

KU Mission

As a world-class, research-intensive institution, KU will:

- Set new standards in education, research and scholarship that will benefit the UAE and the world.
- Drive Abu Dhabi and the UAE as a knowledge destination and engine for socio-economic growth through active translation of research into the nation's economy.

- Seamlessly integrate research and education to produce world leaders and critical thinkers in applied science, engineering, management and medicine.
- Continuously innovate and integrate the global standard in methods of learning and discovery.
- Build a diverse community of service-oriented, ambitious and talented individuals, through an environment that encourages and nurtures creative inquiry, critical thinking, and human values.
- Empower the community with practical and social skills, business acumen and a capability for lifetime learning that will enrich the workforce of the country.

ACCREDITATION

All of Khalifa University's programs are accredited by the UAE Ministry of Education. A number of our undergraduate programs are also accredited by the international engineering accreditation body ABET:

- BSc. Aerospace Engineering
- BSc. Biomedical Engineering
- BSc. Chemical Engineering
- BSc. Communication Engineering
- BSc. Computer Engineering
- BSc. in Electrical Engineering
- BSc. Electrical and Electronic Engineering
- BSc. Mechanical Engineering
- BSc. Petroleum Engineering

UNIVERSITY FINANCIAL RESOURCES

Khalifa University of Science and Technology is a not-for-profit, public institution. The core budget of the University is provided by the Government of the Emirate of Abu Dhabi. The University is a semi-government entity with an independent legal personality, financial and administrative independence, and full legal competence to practice its activities and achieve its objectives.

ORGANIZATIONAL STRUCTURE

The Board of Trustees, in its meeting of March 2017, appointed an interim leadership team to lead the integration of the three constituent institutions to form the new Khalifa University of Science and Technology. These appointments included the interim president and three executive vice presidents to oversee administrative functions, academics, and research and development. During the interim period, organizational charts for the three merging institutions, as well as associated positions, remain in effect until the fully integrated structure is completed and approved by the Board of Trustees. Finalization of the fully merged organizational structure is anticipated in early Fall 2018.

BOARD OF TRUSTEES

Khalifa University of Science and Technology Board of Trustees consists of prominent individuals with extensive experience in government, academia, and industry.

The Chairman of the Board is His Highness, Sheikh Hamed bin Zayed Al Nahyan, the Chief of Abu Dhabi Crown Prince's Court.

The Vice Chairman of the Board is HE Hussain bin Ibrahim Al Hammadi, UAE Minister of Education and Cabinet Member

Other members of the Board of Trustees are:

- **HE Dr. Sultan Al Jaber**,
Minister of State, CEO, Abu Dhabi National Oil Company
- **HE Ali Rashid Qanas Al Ketbi**,
Acting Director, Human Resources, Abu Dhabi Government
- **HE Prof. Maha Barakat OBE PhD FRCP**,
Senior Advisor, Abu Dhabi Executive Office,
Senior Advisor, Mubadala
- **HE Homaid Abdullah Al Shimmari**,
CEO, Aerospace and Engineering Services,
Mubadala

- **Eng. Salah Abdullah Al Abdooli**,
CEO, Etisalat Group
- **HE Abdulmunim Saif Al Kindy**,
Director of Exploration, Development, and
Production, Abu Dhabi National Oil Company
- **Mr. Abdelaziz Abdullah Alhajri**,
Director of Refining and Petrochemicals, Abu
Dhabi National Oil Company
- **Dr. Nawal Khalifa Al Hosany**,
Deputy Director General at Emirates Diplomatic
Academy
- **Dr. Martin Schmidt**,
Provost and Professor, Massachusetts Institute
of Technology (MIT)
- **Ms. Vicki Halloub**,
President and CEO, Occidental Corporation
- **Ms. Marillyn Hewson**,
Chairman, President, CEO Lockheed Martin
Global
- **Dr. Fred Moavenzadeh**,
Professor, MIT; former President Masdar
Institute

MERGED UNIVERSITY FACILITIES

MAIN CAMPUS

Nursery

Khalifa University of Science and Technology Nursery Center is currently under tendering process and expected to start operating in Jan 2019. It is located at the new extension to the Main Campus. The aim of the Nursery is to provide a warm, caring and safe environment for the small children of our students, to develop their abilities by using play and planned activities for all age ranges. We look forward to working with you and your child to ensure that their time spent at the Nursery is productive and happy.

Telecommunication Customer Service Office (Etisalat)

The Main Campus Student Hub, ground floor, hosts an Etisalat kiosk that operates from 8am to 5pm Sunday through Thursday, and provides limited services from 9am to 4pm on Saturdays. Etisalat is one of the Middle East's leading telecommunications providers and has the right to sell all agreed Etisalat products, services and offers at its kiosk, including:

- New connections (prepaid and postpaid SIM cards, internet, landlines, TV bundled packages).
- Smart devices (iPhone, Samsung, tablets, etc.) .
- Replacement of SIM Cards
- Bill payment

Food Outlets and Retailers

The Main Campus offers a broad range of food and drink outlets operated by external providers. The University aims to ensure a range of high-quality food and drink that offers convenience, customization, choice, value for money, and an environment that meets the demographic, lifestyle, belief and cultural diversity of the University. The experience that our staff, students and visitors have from eating and drinking on campus, and the interactions that they have with us, should be positive and have a positive impact on their view of the University.

On the Main Campus, the primary dining area is located in the Student Hub, and offers students a comfortable area to relax between classes, do classwork, or have a lunch or coffee with friends. There are a wide variety of restaurant and food options on Khalifa University's main campus:

- Main Restaurant - Located in the Student Hub Building on the ground floor. Lunch is served from 11:30am-4:30pm.
- Subway - Located on the ground floor of the L Building.
- Costa Restaurant - Located beside the R Building. Serves coffee, tea, soda and cakes and sandwiches.
- Cafe du Roi - Located beside the R Building. Serves pasta, soups, sandwiches and salads.
- Starbucks – Located in Student Hub, ground floor. Serving both students and the public.

- Doctor Shawerma – Located in Student Hub food court. Services include shawerma sandwiches, juice and snacks.
- House of Tea – Located in Student Hub food court. Serves hot and cold drinks (karak tea, haleeb Ginger) and sandwiches (parotta).
- Just Burger – located in Student Hub food court, serving traditional burger gourmet with other grilled items.
- Circle K Minimart – Located in Building M, ground floor. Serves Mini grocery stuff with selected snacks, cold and hot beverages.
- Vending machines - Located throughout the campus in the following locations: Directly outside the R Building, L Building, and G Building on the 1st floor. Serving snacks and drinks.

Banking Services

A number of ATMs are provided on the Main Campus for the convenience of students, faculty and staff. The ATMs are located in the G building and near the Student Hub link bridge.

Environment, Health, and Safety

The University conducts periodic Environment, Health and Safety (EHS) briefings, which are mandatory for students. Students are responsible for understanding the environment, health and safety materials and instructions presented at these briefings and for acting in accordance with them.

Environment, Health and Safety Procedures for Lab and Workshop Facilities

In an engineering university, students are expected to use instruments, equipment and materials that are potentially hazardous. For this reason, students are required to attend environment, health, and safety inductions and orientations, and to read the Environment, Health and Safety manuals associated with all lab and workshop activities. Students will not be allowed to participate in lab or workshop activities unless they have demonstrated a clear understanding of the safety procedures involved.

Students may not work alone in a lab or workshop in case of an accident or medical emergency. Inattention or disruptive behavior will not be

tolerated in any lab or workshop activity. Repeated cases will be referred for disciplinary action. Equipment, tools and materials must be handled in a manner that is safe for the student as well as for other students and the instructor. Students have a responsibility to report any infringements that they witness.

Further information is available in the Environment, Health and Safety manuals.

Building Access After-Hours

Students may be granted building access during non-operational hours provided that a responsible University employee completes an online request form and submits it to the relevant Department Head. The form must contain the names of each student being granted access and the termination date for this access. Student access will be automatically terminated at the end of each semester. The relevant Department Head and employee must approve the form. Facilities Management will reprogram the electronic lock within three days of the receipt of the request or issue a key as applicable.

Safety and Security

The University maintains community areas that are open, well-lit and staffed by receptionists and uniformed security personnel. Although movement on the campus is free, female students are encouraged not to linger after the working hours in public areas in the interest of safety. Female students may request a personal safety escort to and from any campus location, should they be on campus after dark.

The Student Services female administrative team is responsible for the care and needs of female students on campus. This team is responsible for providing women on campus with specific information and services to ensure a healthy, safe, and secure environment.

Off-campus activities are sometimes required as part of a student's academic program. Should a fieldtrip or other external activity be necessary, the student guardian will be notified and written permission received before a female student will be permitted to leave campus.

The Student Services employ a qualified female student counselor to confidentially discuss issues and provide advice to female students on personal, emotional, or academic problems.

Health Services

The Main Campus employs a nurse to provide first aid services and emergency care. The nurse also gives advice on healthy lifestyle and other related health issues.

Students are required to complete a Medical Record Form giving details of their medical history and specific instructions for emergency situations. Students should inform the nurse of any medical ailments or ongoing treatment. A female nurse is on full time duty to care for female students who require emergency treatment while on campus. Minor ailments will be treated at the First Aid Clinic in private treatment rooms. A female nurse will be in attendance should a doctor be required.

In cases of accident or emergency, a nurse is on call to attend to the patient. Except in life threatening situations, the patient will not be moved, until an authorized person arrives and assesses the injury. Guardians will be notified as quickly as possible and instructions on the student's Medical Record Form adhered to where possible.

In addition to general medical assistance for all students, the First Aid Clinic offers a Well-Women Service that provides advice and a range of programs designed to educate and increase awareness on a spectrum of women's health issues.

Emergency Services

Emergency services are provided by the EHSS Services, which operates 24/7. These services can be requested by calling or contacting the Emergency team/Security on **02 401 8200**. Emergency phones are located throughout the campus for your safety and convenience.

The University has in place a number of procedures to respond to emergency situations that might arise. The Emergency Response plan will provide you with the knowledge you need to stay safe.

Please refer to the University's Emergency Plan for additional information.

KU Security guards is your first contact point for any incident or emergency on each campus. They will coordinate any emergency response 24/7.

Rapid response is generally initiated when Security Services is contacted by staff, students or visitors via:

- a call to the emergency line **02 401 8200**
- one of the Patrolling Security on the campus
- any lift phone
- alarm notification, e.g. fire alarm.

Responses are managed from the Security Services Control Room/ command room and overseen by the Emergency Response team (ERT).

Prayer Rooms

Purpose built rooms are located across all campuses for prayers. This includes separate areas for wudhu ablution for both men and women. Please refer to the campus map to locate the prayer rooms.

Student Lounges

Separate lounge areas are provided for male and female students. Please refer to the campus map to locate the student lounges.

Sport Facilities

All sports and fitness facilities are gender specific and are provided for the use of University students with a valid student card. The facilities are strictly for the University's students, staff and faculty and all users are required to produce their ID cards if so requested by staff manning the Reception area or security. The Sports Complex in the Main Campus is located in Building D, next to the Student Hub.

A state-of-the-art on-campus sports facility is presently under construction, which will include:

- One Squash Court (for males) and one miniature basketball court (for females)
- Weightlifting Area (one for males and one for females)
- Cardio Area (one for male and one for females)
- Outdoor tennis court

- Outdoor basketball court
- Outdoor running track
- Outdoor miniature basketball court
- Stretching area
- Group exercise studios (three studios for each gender)
- Multi-use indoor fields for basketball, football, handball, volleyball, badminton, etc.
- Table tennis room
- Pool table room
- Ladies' spa (under process)
- Juice bar (under process)

MASDAR CITY CAMPUS

Student Residences

The residences at the Masdar City Campus 1A building are split into four blocks, comprising three floors of apartments, while 1B building contains additional housing blocks with four floors each. The blocks are divided into male and female residences. Each apartment has a bedroom, kitchen, toilet and shower, living/dining and study area. Some of the apartments comprise more than one bedroom. All apartments have private balconies.

Laundry

There is a shared laundry room located within each of the blocks. There are also several common sitting spaces and external balcony areas within each of the blocks.

Majlis/Common Areas

Common areas are provided on the podium level of campus. Male and female majlis (lounge) areas are located in 1A and 1B. Common spaces can be found in 1B and in the Learning Center and restaurants, cafes, and the canteen.

Prayer Rooms

There are both male and female prayer rooms located within the campus (please refer to Masdar City Campus map).

Parking

At the Masdar City Campus, cars are permitted to be parked in the North Car Park adjacent to the Personal Rapid Transport (PRT) station, or in the Multi-Use Hall car park. Parking spaces are limited, as spaces must accommodate faculty, students and staff, and cannot be reserved. All student cars are required to display a valid MI access sticker to enter the Masdar City site. To apply for an MI car parking sticker, submit an application form to the Security Office of the EHSS Department. Student cars are not allowed for drop-offs or pickups on the podium level.

Security

Security guards are located at each accommodation site and are present 24 hours daily. The security guards are responsible for controlling entry and exit and for carrying out regular patrols of the area.

Recreational Facilities

The Masdar City Campus is equipped with a sports facility and a sizable gym at the Multi-Use Hall. A Student Athletics office is available, and led by a dedicated staff, who organize sporting and recreation activities.

Recycling

Dedicated bins are provided in the kitchens for recycling at each of the residence buildings.

Dining Services

Masdar Campus offers a broad range of food and drink outlets operated by external providers.

On Masdar Campus, the primary dining area is located in building 1A ground floor, and offers students a comfortable area to relax between classes, or have a lunch or coffee with friends.

The following food outlets offers quality range of different menu types and items as following:

- Main Restaurant - Spinneys canteen caters to the needs of staff and students with buffet and a la carte menu of hot meals three times a day, located in 1A Building, ground floor.
- Barbacoa Mexican Cuisine – a Mexican traditional cuisine, serving quality range of the famous Mexican dishes.

- Café Il Di Roma – Providing hot and cold beverage menu items with a range of quality sandwiches and sweets.
- Caribou Café – Providing hot and cold beverage menu items with a range of quality sandwiches and sweets.
- Jim's Kitchen Table- located in the ground floor of Semens building, serving quality healthy option food items.
- Papparoti Café - Providing hot and cold beverage menu items with a range of quality sandwiches and sweets.
- Sumo Japanese Cuisine – serving the famous Japanese food including the Sushi and Bento menus.
- F-Mart Supermarket – Mini market providing grocery items with sandwiches, mini snacks, hot and cold beverages.
- Skinny Genie – healthy food items provided through good quality menu included hot meals, light meals, and snacks.

Health Services

Masdar Campus have "The Doctors Medical Center" which is a First Aid Clinic provide primary health care to the students, faculty, and staff members on Campus. The center opens during the working Hours: 8.30am to 5.30pm (Sunday to Thursday)

Maintenance

Masdar City Campus residents are requested to notify/email the Helpdesk immediately for any disrepair, damage or defect affecting the room or buildings. We will then arrange for the repair to be carried out. Please remember that access to the property will be required by the contractors in order to complete a repair.

SAS AL NAKHL CAMPUS

Housing

The men's residences are centrally located among the academic and administrative buildings of the Sas Al Nakhl Campus. There are individual studios and 2-4 person apartments in each of the eight residential towers. Each apartment is equipped with a kitchenette and all buildings on campus are easily accessible on foot. The women's residence is in a satellite location, accessible by shuttle bus or car, near the Maqta Bridge. There are two residential towers and one central administrative building. All of the two and three bedroom apartments are equipped with full kitchens and laundry facilities.

Dining Services

Satah, the Student Center is the main dining facility for male students. It serves three meals a day for the Sas Al Nakhl Campus community. Cafeterias, open for breakfast, lunch and snacks, are located in Habshan, and Zarkuh buildings. A small café is also available in Bu Hasa Building offering breakfast, light lunch and snacks. An ADNOC Oasis convenience store is located in the center of the Men's Campus. The Arzanah building has a large dining facility for female students. It serves two meals a day. There is also a café and ADNOC Oasis convenience store in the building. Student ID cards can be used as a means for payment at main dining facilities. The cards can be charged with cash at special ATMs in the main canteens. More information on this can be obtained from the Student Office Support (SOS) Center or Residence Life Offices.

Sports and Fitness Facilities

The men's section of the campus has a grass soccer field and outdoor basketball court. The second floor of the Satah, Student Center houses a variety of fitness and weightlifting equipment and is open for use from 7:00am -11:00pm daily. The women's section of the campus features a gym, an outdoor volleyball and badminton court and a jogging and circuit fitness track. Regular intramural sports tournaments are organized, including indoor soccer, basketball, volleyball and table tennis. The women's dorm has a multi-function fitness room in Tower 2, the main administrative

building. Furthermore, one of the residential villas contains a variety of fitness equipment, bicycle 'spinning' room and floor exercise facilities.

Student Centers

The Student Centers are located in the Satah Building in the men's section and the Arzanah Building in the women's section. A number of student lounges are also available. These student-centered facilities provide a dedicated setting for social, organizational, and extracurricular activities. The Student Centers are equipped with computers, gaming tables, large flat screen televisions, etc.

Health Services

First Aid Clinics provide primary health care to the students, faculty, and staff members on the Sas Al Nakhl Campus. The Sas Al Nakhl Clinic (open to male/female students) is open Sunday-Thursday 7:00am to 11:00pm and provides 24-hour accident and emergency care. Depending on the nature of the illness, patients may be referred to other hospitals or clinics for further treatment.

ADMISSION REQUIREMENTS AND FEES

Khalifa University of Science and Technology admits male and female undergraduate and postgraduate students from the UAE and around the world. The admissions standards and requirements stated in this section are the basis on which a prospective student's application is assessed. Details of the admissions requirements, placement tests, recognized secondary school certificates, and the process for transfer students are set out below.

UNDERGRADUATE ADMISSIONS

Undergraduate program admission at Khalifa University of Science and Technology is offered to highly qualified female and male students from the UAE and abroad. All applicants must meet established, clearly communicated minimum requirements to be considered for admission to, and maintain enrolment in, undergraduate studies at the University. The Board of Trustees reserves the right to deviate from published admission requirements.

UNDERGRADUATE ADMISSIONS REQUIREMENTS

Students seeking admission into any of the Khalifa University of Science and Technology's undergraduate programs must have graduated from high school within the past two years and meet the following minimum criteria:

Undergraduate admission to Khalifa University is highly competitive. In order to be considered for admissions, students must meet the following minimum criteria:

SCHOOL SYSTEM	KU ADMISSION CRITERIA
Advanced Science Placement from ATHS (ASP)	Minimum overall achievement of 80% and a minimum of 80% in Mathematics
ATHS Engineering science cluster: <ul style="list-style-type: none"> ESG: Engineering Science General ESE: Engineering Science Energy 	Minimum overall achievement of 80% and a minimum of 80% in Mathematics
ATHS following clusters <ul style="list-style-type: none"> AEM: Applied Engineering Mechanical AEE: Applied Engineering Electrical ICT: Information and Communication Technology HST: Health Science and Technology 	Minimum overall achievement of 80% and a minimum of 85% in Mathematics
Secondary Technical School (STS)	Minimum overall achievement of 90%

The Undergraduate Admission Criteria for different secondary school certificates are as detailed below:

American System

- Complete 12 years
- Minimum GPA 3.0 (or equivalent) on scale of 4
- Mathematics in 3 of last 3 years, Physics in 2 of last 3 years, and Chemistry in 1 of last 3 years.
- Minimum score of 80 in Mathematics
- At least 1 science (Chemistry or Physics) in last year.

British System

- Total of 8 courses 5 - 0 level including Mathematics, Physics and Chemistry, 3 - AS/A levels including Mathematics, and (Physics or Chemistry).
- Minimum grade of C in all courses.

International Baccalaureate - IB

- IB diploma with minimum score of 4 (out of 7) in all courses.

- Applicant should have graduated from High School no later than two years prior to the current year.
- Hold a UAE Secondary School Certificate (SSC) in Advanced Stream – Ministry of Education or Physics Stream – Abu Dhabi Education Council with a minimum overall achievement of 80%, and a minimum score of 80% in Mathematics or equivalent. Unless you are from one of the following systems:

- Courses should include Mathematics, Physics, and Chemistry.

For students without the UAE Secondary School Certificate (SSC), the equivalent requirements as approved by the UAE Ministry of Education are applied. (Recognized Secondary School Certificates).

There are different forms of acceptance to Khalifa University. Full Admission is for freshmen students that already meet the requirements. Conditional Admission is for freshmen students that do not necessarily meet all the requirements, but are considered to have a strong potential to meet all necessary requirements. An Entry Assessment is required for students prior to acceptance. Some students might be exempted if they are from any of the listed exempted systems.

UNDERGRADUATE ADMISSIONS - TYPES**Full Admission**

In addition to the minimum admission criteria, to be considered for full-admission, applicants must also satisfy the following requirements:

1. Proof of English language proficiency which may take one of the following forms:

- A TOEFL minimum 79 on the Internet Based Test (IBT).
- An academic IELTS minimum score of 6.0 (out of 9).
- An EmSAT minimum score of 1400

Note: TOEFL and IELTS scores are valid for two calendar years only and should be taken from an approved Institution. (TOEFL - Test of English as a Foreign Language | IELTS - International English Language Testing System)

2. Pass a admission test in Mathematics (Algebra and pre-Calculus) and Physics sample admission tests can be found on the website.

3. Satisfactory entrance interview

Conditional Admission

Applicants who do not meet the requirements for full admission as freshmen, but who are judged to have the potential to reach these standards, may be offered a conditional admission and required to complete a Preparatory Program.

In addition to the minimum admission criteria, to be considered for conditional admission, applicants must satisfy the following requirements:

Proof of English language proficiency which may take one of the following forms:

- A TOEFL minimum score of 61 on the Internet Based Test (IBT).
- An academic IELTS minimum score of 5.0 (out of 9).
- A CEPA minimum score of 174 or an EmSAT minimum score of 1100.
- Or equivalent in other tests approved by MOE.

The Preparatory Program is an intensive, full-time program of developmental study in academic and technical English, mathematics, physics and computer technology required for success in a Khalifa University degree program. Students who

successfully complete the program are offered full admission into the degree programs.

Students who are not able to achieve the standard for successful completion of the Preparatory Program within 12 months will have their conditional admission withdrawn, and they will be asked to leave the University.

ENTRY ASSESSMENT

Students who do not have proof of the English proficiency are required to take a University administered test of English. In addition, students in all engineering programs must sit for required admission tests in mathematics. Sample admission tests can be found on the website.

All exams will be administered in English with the use of an English language dictionary.

In addition, all students must participate in a personal interview conducted by a Khalifa University admissions committee.

During the interview, students will be assessed on:

- Ability to communicate in English
- Familiarity with the relevant profession
- Commitment to pursue a professional degree program
- Reasons for wanting to attend Khalifa University
- Potential leadership capabilities in the UAE

EXEMPTED SYSTEMS FROM ENTRY ASSESSMENT

All official AP scores should be sent directly to KU registration department by using our college code 7860.

Students from the below listed systems might be exempted from the Entry Assessment:

College Board Advanced Placement (AP)

AP EXAM	SCORE
Math: Calculus AB	3
Math Calculus BC with AB sub-score	3
Math: Calculus BC	3
Physics A or B	3
Physics C Mechanics	3
Physics C Electricity, Magnetism	3

International Baccalaureate

HL EXAM	SCORE
Mathematics	4
Physics with Magnetism	4

Advance "A" Level GCE (General Certificate of Education)

A-LEVEL EXAM	GRADE
Mathematics	c
Physics	c

ADVANCED STANDING CREDIT AND CREDIT BY EXAMINATION POLICIES AND PROCEDURES**POLICY 5.6.1.2****ADVANCED STANDING CREDIT**

Khalifa University may award advanced standing credit for certain academic work completed prior to enrollment at the University. This includes sufficiently high scores on some national/ international secondary school examinations such as the College Board Advanced Placement (AP), International Baccalaureate (IB), and Advance "A" Level GCE (General Certificate of Education). This may make it possible for a student to complete the Bachelor's degree in less than the normal duration or take other courses.

Advanced Standing Credit may only be granted after the student has been fully admitted as a freshman to Khalifa University. All students who would like to be considered for advanced standing credit must complete the Advanced Standing Credit Evaluation form at the Office of Admissions and Registration and provide either the original score certificate or an official copy from the appropriate examining agency. Each student will be evaluated on a case-by-case basis. All students must submit their request for advanced standing credit evaluations within the first semester of their freshman year at Khalifa University. Credits earned through "Advanced Standing" are considered "transfer credits" (non-residence credits) for degree requirement purposes.

**POLICY 5.6.1.3
CREDIT BY EXAMINATION**

A qualified student enrolled at Khalifa University may pass a specially prepared challenge examination and receive credit for a University course without having undertaken the normal course work. Interested students should contact the Chair of the Department in which credit is sought to request administration of an examination. Since it may not be appropriate to award credit based on Advanced Standing for some courses, the decision to offer an examination rests with the Department. If the Chair of the

Department authorizes an examination, the student is instructed to complete the Credit by Examination form at the Office of Admission and Registration. Hours earned through Credit by Examination will be indicated on the transcript, but no grade points will be awarded. Hours attempted will be assigned equal to the hours earned. Failure on such an examination will incur no grade point penalty or hours attempted. Credits earned through "credit by examination" are considered in residence credits for degree requirement purposes.

Credit by Examination is subject to the following conditions:

1. Credit by Examination testing will normally be offered during the final examinations period.
2. Students may attempt Credit by Examination in a given course only once.
3. No more than 12 credit hours of Credit by Examination may be included in a major program.
4. No more than 6 credit hours of Credit by Examination may be included in a minor program.
5. Credit by Examination test scores will be reported with a P or U grade. Neither grade will be included in the calculation of the student's GPA.
6. Students requesting Credit by Examination must satisfy all pre-requisites of the course for which they are being examined.

PROCEDURES FOR ADVANCED STANDING CREDITS COLLEGE BOARD ADVANCED PLACEMENT (AP)

Khalifa University grants credit for a score of 4 or 5 on certain College Board Advanced Placement (AP) exams. The University does not grant credit for secondary school courses teaching AP curricula, or partial credit for lower scores. If the AP exam is taken more than once, the higher score will be counted.

All official AP scores should be sent directly to KU registration department by using our college code 7860.

Details of credit for various exams appear below:

AP EXAM	SCORE	EVENT
Math: Calculus AB	4/5	MATH 111
Math Calculus BC with AB sub-score	4/5	MATH 111
Math: Calculus BC	4/5	MATH 111, MATH 112 via credit-by-examination
Physics A or B	Any	No Credit
Physics C Mechanics	4/5	PHYS 121
Physics C Electricity, Magnetism	4/5	PHYS 122
Chemistry	4/5	CHEM 115
Psychology	4/5	HUMA 140
Computer Science A	4/5	ENGR 112

INTERNATIONAL BACCALAUREATE

Khalifa University grants credit for a score of 5 or higher on certain Higher Level (HL) International Baccalaureate (IB) exams. The University does not grant credit for secondary school courses teaching IB curricula, or partial credit for lower scores. If the IB exam is taken more than once, the higher score will be counted.

Details of credit for various exams appear below:

HL EXAM	SCORE	EVENT
Mathematics	5/6/7	MATH 111, MATH 112 via credit-by-examination
Physics with Magnetism	5/6/7	PHYS 121 via credit by examinations, PHYS 122 via credit by examinations
Chemistry	5/6/7	CHEM 115
Psychology	5/6/7	HUMA 140
Computer Science	5/6/7	ENGR 112

ADVANCE "A" LEVEL GCE (GENERAL CERTIFICATE OF EDUCATION).

Khalifa University grants credit for a grade of B or higher on certain A-level exams. The University does not grant partial credit for lower grades. If the A-level exam is taken more than once, the higher grade will be counted.

Details of credit for various exams appear below:

A-LEVEL EXAM	GRADE	EVENT
Mathematics	B/A	MATH 111, MATH 112 via credit-by-examination
Physics	B/A	PHYS 121 via credit by examinations, PHYS 122 via credit by examinations
Chemistry	B/A	CHEM 115
Psychology	B/A	HUMA 140
Sociology	B/A	HUMA 141
Computer Science	B/A	ENGR 112

UNDERGRADUATE ADMISSIONS - DOCUMENTS

The following documents are required as part of the admissions process:

1. A completed Khalifa University online application form
2. An attested copy of High School certificate. Private school students should submit copies of their grade 10 and 11 certificates. British System students should submit certificates of their O level, AS and A levels. If final certificates are yet to be issued, a letter from the school stating predicted grades is required.
3. TOEFL or IELTS certificates (original, plus an extra copy) if any.
4. Good Conduct Certificate
5. Passport (two copies)
 - front and back page for UAE Nationals
 - with visa permit for UAE residents
6. A complete copy of Khulasat Al Qaid (UAE National Family Book) for UAE Nationals.
7. Passport size photograph (five copies)
8. Emirates ID (two copies)

Important notes:

- Copies printed onto A4 paper should be submitted, unless otherwise stated. Original documents maybe requested for verification.
- Please provide the school's grading scale equivalency where required.
- All foreign and private school certificates must be equated and attested by the Ministry of Education in UAE.
- Applications with missing documents will not be accepted.

SELECTION PROCEDURE UNDERGRADUATE ADMISSIONS - PROCEDURE

Khalifa University applies a certain admission procedure to guarantee the quality of the student body. Therefore, every application should pass the following five stages:

1. **Online Application**
2. **Application Screening**
3. **Documents & Assessments**
4. **Application Evaluation**
5. **Final Decision**

Online Application

UAE National Students and International Students should make an application online only if they meet the minimum requirements. We only accept completed online applications that include the grades of at least the first high school term.

2. Application Screening

All completed applications are screened thoroughly against Khalifa University admission requirements. All rejected applicants are notified.

3. Admission documents and assessments

All eligible applicants are invited to sit for a mathematics and physics entry assessment (except for those who are eligible for Exemption from Entry Assessment) and conduct a personal interview. UAE nationals will sit the test and attend the personal interview on the same day; non-UAE nationals will be invited to interview based on the outcome of the entry assessment. Applicants should bring their admission documents to be

submitted to the Office of Student Recruitment and Admissions on the same day as the interview.

Notes:

- If the applicant does not possess a valid English proficiency certificate, an English admission test will be taken on the same day as the entry assessment.
- Please go to the website see a sample of the entry assessment.

4. Application Evaluation

The admission department will make recommendations regarding the qualified applicants through an internal process based on the admission assessments results and high school grades. The duration of this process will vary from one applicant to another based on different factors.

5. Final Decision

The admission committee will announce the admission decisions in an adequate time prior to the start of the semester. Each accepted applicant will be contacted and sent the admission offer. Rejected candidates will be notified too.

TRANSFER STUDENTS

Students wishing to transfer to Khalifa University of Science and Technology should meet the University's admission requirements, as stated previously. In order to be considered for admission, all potential transfer students should submit an official copy of their transcript(s) and an explanation letter for the transfer, in addition to the other required admission documents, a list of which are outlined on the website.

CURRENT STUDENTS

Students currently enrolled at Khalifa University of Science and Technology may request pre-approval to take course(s) for credit at another federal or licensed institution in the UAE or a recognized foreign institution of higher learning (as identified by the UAE Ministry of Higher Education and Scientific Research). This request and all supporting documents must be submitted at least one month prior to the student taking the course(s) at the other institution. A decision will be provided no later than two weeks from receiving the request.

The decision to approve a course is discretionary and will be based on two factors: a review of the content and level of the course under consideration (as described below) and an assessment of the student's overall academic performance at Khalifa University of Science and Technology. Taking a course for credit at another institution may not be used to avoid the University's progression rules or the consequences of poor performance in other Khalifa University of Science and Technology courses. Once the student completes the approved course(s) at the other institution then he/she should apply for credit transfer evaluation as described below.

CREDIT TRANSFER EVALUATION

Transfer evaluations are done on a course-by-course basis. Students who request a transfer course evaluation must provide information about the course from the official catalog, including course descriptions and course syllabi. To consider a course for transfer, the student must have earned a grade of C (2.0) or better.

Any decision to approve a course transfer will include an assessment of the student's overall academic performance at Khalifa University of Science and Technology. High marks in transfer coursework should be matched by high performance - at the student's previous institution (for transfer students) or at Khalifa University of Science and Technology (for currently enrolled students). Transfer courses may not be used to avoid the University's progression rules or the consequences of poor performance in other University courses. For example, a student who fails a Khalifa University of Science and Technology course may not complete the course by taking it in transfer at another university.

- Courses are evaluated based on their content and level. For a course to be transferred to Khalifa University of Science and Technology, it must be equivalent to an existing University course in terms of content and level of difficulty. These evaluations are conducted by knowledgeable faculty whose decisions are final.

- The maximum number of approved transfer credits allowed must be less than 50% of the total credits required by the student's degree program at Khalifa University of Science and Technology.
- Only credits transfer, not grades. Credits accepted in transfer are not used in calculating a student's grade point average at Khalifa University of Science and Technology. Credit will not be granted twice for substantially the same course taken at two different institutions.
- Transfer credits will not be given for work experience, vocational or training courses or coursework that is considered pre-collegiate.
- The above criteria also apply to transfer credit evaluations involving articulation agreements between Khalifa University of Science and Technology and other institutions of higher education.
- Transfer students must also meet all graduation requirements as specified in the University Degree Requirements and Graduation Residence Requirements of this Catalog.

SCHOLARSHIPS AND STIPENDS

The University scholarships and stipends are governed by the following rules and conditions:

- University scholarships and stipends are available for qualified and eligible UAE National, expatriate and international students.
- A list of available scholarships and stipends, eligibility criteria, and benefits for each category of student are reviewed and updated annually. Current information is published on the University website.
- Students on a university scholarship must abide by the stipulations and contracts signed between the student and the University.
- University scholarships and stipends are provided only for full-time students. If the credit load of a student on a university scholarship drops below the minimum full-time credit load (12 credit hours) in a semester, the scholarship and any stipend will be adjusted as follows:
 - » The stipend, if any, will be suspended for the remainder of the semester unless the student is in the final semester of study and requires less than 12 credit hours to

graduate, or if the reduced enrollment is determined to be the result of a serious compelling circumstance beyond the student's control.

- » Expatriate and international students will be liable for full payment of the tuition fees for that semester. The expatriate/international student may be allowed to drop below the minimum full-time credit load without tuition penalty if the University determines that the reduced enrollment is the result of a serious compelling circumstance beyond the student's control.
- The University reserves the right to change the terms and conditions of its Scholarship and Stipend Programs at any time.
- The University reserves the right to revoke a student's scholarship.
- Students receiving a university scholarship must inform the University of any external scholarships received.
- A student receiving a university stipend is discouraged from seeking additional employment while enrolled in courses at the University. Should the student wish to supplement their stipend with university work-study, permission from the relevant Dean must be obtained.
- In case of violation of the scholarship terms and conditions, a student receiving a university scholarship or stipend may be required to refund part or all of tuition fees covered by the scholarship and stipends paid.

SCHOLARSHIPS AND STIPENDS FOR UAE NATIONAL STUDENTS

University scholarships and stipends are available for admitted UAE National students. The financial award consists of, at a minimum:

- A 100% tuition fee waiver for the duration of their study at Khalifa University of Science and Technology;
- A monthly stipend based on the student's CGPA (no stipend is paid to students whose CGPA falls below the set minimum as published in the student handbook);
- Housing fees covering double occupancy for students residing more than 80km from campus;

- Daily and weekend transport fees for those eligible UAE National students who are not receiving their stipend for any reason;
- Other published benefits.

SCHOLARSHIPS FOR EXPATRIATE AND INTERNATIONAL STUDENTS

University scholarships are available for expatriate and international students with outstanding academic performance and personal qualities.

- The scholarship may consist of full or partial tuition assistance. In addition, highly qualified expatriate and international students may also qualify for a stipend or academic merit award.
 - » Eligibility criteria and benefits are published on the University website.
- Scholarships for expatriate students are provided for the total degree credits of the program in which they are enrolled. Attempted credits that are beyond the total degree credits and credits that do not count towards the degree will be charged at the full rate per credit tuition fee unless the excess credit is the result of university curriculum changes.
- Upon graduation, expatriate students on full scholarship undertake to either join one of the University's graduate programs or to accept employment with the University or any other entity nominated by the University for a period of time which is at least equal to the study period. The decision of whether or not to offer graduate program admission or employment is at the discretion of the University.

STIPEND PAYMENT PROCEDURES

Stipends are payable only in the semester they are earned. No retroactive stipend payments for prior semesters are allowed.

- To receive a stipend, a student must continue to satisfy the published academic eligibility requirements.
- The student must have a valid bank account in his or her name into which the stipend payment is electronically transferred. It is the student's responsibility to create the bank account and provide the account details to the Registrar's Office.
 - » To ensure payment of the stipend, the student should provide his or her bank

account details to the Registrar's Office by the sixth week of their first semester. Students who fail to provide their bank details by the end of the sixth week of classes will forfeit all stipend payments for that semester.

- To receive a stipend each month, a student must be enrolled in courses when the stipend bank transfer is processed by the University. A student who withdraws from the University prior to the bank transfer date will not receive a stipend for that month.

Students are not eligible to receive a stipend payment during a Temporary Leave of Absence from the University.

EXTERNAL SCHOLARSHIPS

External scholarships are governed by the stipulations and contracts signed between the scholarship granting entity, the individual student, and the University.

- For students who are newly sponsored by an external agency or who wish to revert to a Khalifa University of Science and Technology scholarship and stipend, the effective date of sponsorship transfer will be the first day of the month following the sponsorship approval.
- Tuition charges for students sponsored by an external agency will be based on the published refund schedule. Invoices will reflect the student's enrollment as of the census date.



ACADEMIC REGULATIONS

DEGREE PROGRAMS OFFERED

The undergraduate degree programs offered by the College of Arts and Sciences are:

- Bachelor of Science (BSc) in Applied Mathematics and Statistics
- Bachelor of Science (BSc) in Chemistry
- Bachelor of Science (BSc) in Petroleum Geosciences

The undergraduate degree programs offered by the College of Engineering are:

- Bachelor of Science (BSc) in Aerospace Engineering
- Bachelor of Science (BSc) in Biomedical Engineering
- Bachelor of Science (BSc) in Chemical Engineering
- Bachelor of Science (BSc) in Civil Engineering
- Bachelor of Science (BSc) in Computer Engineering (with optional concentration in Software Systems)
- Bachelor of Science (BSc) in Electrical Engineering
- Bachelor of Science (BSc) in Industrial and Systems Engineering
- Bachelor of Science (BSc) in Mechanical Engineering
- Bachelor of Science (BSc) in Petroleum Engineering

The length of the undergraduate engineering programs ranges between 136-139 credits. These credits are divided into 43 credits of University General Education Requirements (GER), 27 credits of College of Engineering Requirements (CER), and 66-69 credits of specific major requirements.

UNIVERSITY DEGREE REQUIREMENTS

A student is required to adhere to the graduation requirements stated in the Catalog in effect for the year in which the student was admitted to a degree program, or for the year in which the student declared their academic major, or in the Catalog effective for the academic year when the student graduates.

Degree and major requirements change from time to time and there are established procedures for making such changes that protect the University's integrity and the individual student's welfare. In case of major changes in course offerings, the respective Dean determines the equivalent graduation requirements to be applied. The Khalifa University of Science and Technology will confer the Bachelor's degree when the following requirements have been met:

- Successful completion of the University General Education Requirements described in this Catalog.
- Satisfactory completion of the requirements of the chosen college and degree program as described in the appropriate sections of this Catalog.
- A minimum CGPA of 2.00
- Completion of the last two years in residence at the University. Transfer and exchange students must also meet the additional conditions specified in the Graduate Residency Requirements section of this Catalog.
- Students completing programs with major and minor components must satisfy the requirements specified by the college/department offering the major/minor.
- Students registered for a double major must satisfy the requirements of each major as specified by the college/department offering the major.
- Candidates for degrees must apply on-line to graduate during the first week of classes for the semester in which the student is expected to graduate. The Registration Office initiates the process for graduation only after the application has been submitted by the student. Students must complete all degree requirements by the end of the semester for which they apply to graduate. If a student fails to meet all degree requirements, he/she must reapply to graduate later.

GENERAL EDUCATION REQUIREMENTS

1. English Communication (8 credits):

ENGL111 English Communication I	(4 cr.)
ENGL112 English Communication II	(4 cr.)

2. Math/Science (20 credits):

CHEM115 General Chemistry I	(4 cr.)
PHYS121 University Physics I	(4 cr.)
PHYS122 University Physics II	(4 cr.)
MATH111 Calculus I	(4 cr.)
MATH112 Calculus II	(4 cr.)

3. Business/Economics (6 credits):

Two 3-credit courses in Business/Economics are required for all students.

4. Humanities and Social Sciences Electives (9 credits):

Three 3-credit courses in the Humanities and Social Sciences are required for all students. Students must take at least one course in the area of Islamic Studies and Culture. The current list of courses in this area includes HUMA102 Islamic Culture, HUMA111 Islamic History, HUMA112 Sciences in Islam, HUMA210 Introduction to Islamic Law, and HUMA211 Islam and Modernity. The Office of the Registration keeps an updated list of the approved courses in this category.

DEGREE MAJORS, MINORS, TRACKS AND CONCENTRATIONS

DEGREE MAJOR

A degree major is a structured program of study in an academic or professional discipline which leads to a Bachelor's degree. To fulfill the requirements of a major, students are required to select subjects as specified by the department offering the major. A major comprises at least 30% of the total credits required by the Bachelor's degree program.

Every degree awarded by Khalifa University of Science and Technology requires students to complete a major field of study. All majors include a specific number of credits and a particular

sequence of courses. Students must meet the minimum course and grade requirements to be awarded their Bachelor's degree with a desired major.

Academic majors and their requirements are published in the Course Catalog. Students are required to follow the major requirements that are current at the time the student's choice of major is effective.

Declaring a Major/Change of Major

- Students should make their initial choice of major after completing 15 degree credits. However, they must make their final choice of a major before reaching Junior standing (60 credits.)
- To initially request a major, a student must file an application with the Registration Office. The application form must be approved by the student's advisor and the head of the academic department that offers the major.
- To change an existing major, a student must file a new application with the Registration Office. This application must be approved by the student's advisor and by the head of the academic department of both the student's current major and the student's requested major.
- Changes of major are subject to space being available in the sought major.

Double Major

Students wishing to complete a second major concurrently with his or her primary major must obtain advance written permission from the appropriate department heads and Dean. To be granted permission for a second major, students must be academically well qualified and have a minimum CGPA of 3.0, so as to not delay graduation. In addition, students must apply for a second major by the time they reach Junior standing or 60 credits. The student's application must include a proposed study plan for both majors, with no more than 18 credits applied to both majors. The student's application for a double major will have an advisor in each of the two approved major programs. To graduate with a double major, the student must meet departmental requirements for each major.

DEGREE MINORS

Academic minors afford students the opportunity to pursue a limited but structured field of study outside their major. The minor may be a truncated version of a major or a distinctive subset of a discipline. Minors are not available in every field of study. In general, a minor requires no fewer than 15 and no more than 21 credits, with at least 12 credits in upper level coursework (300-400 level). No more than six credits or two courses may be used to satisfy the student's minor and major fields of study. All courses taken to fulfill minor requirements must be passed with a minimum grade of C. Students must follow requirements for the minor that were in effect when the student's application to pursue a minor was approved.

DEGREE CONCENTRATION

Concentrations refer to a grouping of courses which represent a sub-specialization taken within the major field of study. A concentration at the Khalifa University of Science and Technology leads to a specialized award or degree and will be specified on the diploma and the student's academic record (transcript).

TRACK

A track is a narrow area within the major field of study which the student may choose to follow but does not lead to a specialized award or degree and is not listed on the diploma. Tracks are normally used to help students focus their selection of advanced elective courses within their selected major. The track will only be noted on the student transcript once the requirements are completed and the Bachelor's degree is awarded.

VARIATION TO ACADEMIC PROGRAM

In exceptional circumstances, a student may petition the Department Chair of the major/minor program for approval of changes to the prescribed plan of study. Small changes may be approved by the Department Chair. Significant changes require approval of the Department Chair and the College Curriculum Committee. Students seeking an exception to their official plan of study must submit a signed Variation of Academic Program form to the Registration Office. When it becomes necessary to request a deviation from the prescribed plan

of study, students shall consult their academic advisor prior to submitting the form.

In preparing the form, students must be mindful of the following:

- The course to be substituted must be in the same area as the required course, or in a closely related area.
- Substitution of a course for a previously failed required course is seldom granted.
- A required course that is not scheduled during a given semester is not acceptable for a course substitution. Any approved course substitutions and associated pre-requisite requirements affected by the approved Variation to Academic Program must be satisfied.



GRADUATION

GUIDELINES FOR GRADUATING WITHIN EXPECTED TIME

The Khalifa University of Science and Technology has a strong commitment to ensuring that students graduate with a degree in the expected time. Students are encouraged to follow these guidelines to earn their degrees in the minimum time required.

- Consulting an advisor should be students' first priority. Students should confirm with the advisor that their academic preparation is appropriate for the courses they plan to undertake.
- Transfer students should make sure that they know which credits will be transferrable and plan accordingly.
- Students should seek help in planning course work to meet academic and career goals.
- Students should be certain they understand the requirements of their intended major as well as the options it will provide for future studies and employment.
- Students should be aware of the number of credits their desired degree program requires and should make sure they fulfill on quarter of these each year. Credits may be taken in the fall, spring, and summer, but the annual total should equal at least 25 percent of the total credits needed to graduate. Students should also recognize that a degree requiring more than 120 credits will be difficult to complete in four years without undertaking substantial loads and/or summer sessions.
- Students should make sure that the courses they select will count toward the fulfillment of the University GER, COE, major, and any other requirements.
- Students should limit elective credits to the number the program allows.
- If a student is considering changing their major or does not get admitted to the major program of their choice, they should consult an advisor, explore options, and find out how a change of major might affect their graduation plans.
- Students should make the most of course schedules and plan for their degree program. They should plan to take required courses as soon as possible (as not all courses are offered every semester) and be flexible about course

times. If a required course is not available, advisors can help determine an alternative.

TIME LIMIT ON DURATION OF STUDY AND RE-ADMISSION

All degree requirements must be completed within six (6) years of first registration as a matriculated student, exclusive of any approved leave including national service. The duration of study does not include time spent in a foundation program as a conditionally admitted student. As specified in the withdrawal policy (see ACA 3700 Withdrawal, Discontinuing and Resuming Studies), a student in good academic standing is allowed a total of no more than two semesters of Temporary Leave of Absence.

A student who is away from the university, for any reason, for more than two consecutive semesters must submit a re-application for admission to the Admissions Office prior to the semester for which registration is sought.

- Students who are re-admitted are required to comply with the Catalog of Record for the semester of re-admission.

INTERNSHIPS

All students are required to complete an internship experience to be eligible to graduate. The Internship is a period of work placement conducted with an appropriately selected organization. This requires a carefully planned work experience that will match the content covered in the student's program of study. Engineering students at the Khalifa University of Science and Technology must successfully complete eight continuous weeks of full-time internship placement to graduate. Students earn one credit for internship, which is assessed on a pass-fail basis. The Career and Internship Coordinator is responsible for managing the internship program; this includes sourcing appropriate internship opportunities. However, students provide names and contact information of organizations with which they would like to intern. Complete information about internship requirements can be found in the Internship Handbook.



STUDENT REGISTRATION

ORIENTATION PROGRAM

Newly-admitted students participate in an orientation program that introduces them to various aspects of the Khalifa University of Science and Technology community. During orientation, students can plan their academic program, register for courses, learn about University resources and campus life, and meet with faculty, staff and new classmates. The orientation sessions are held before the fall semester and the spring semester.

REGISTRATION PROCESS

The Registration Office is responsible for the management of the registration process by which students enroll in classes. Registration information is provided to students before the registration period begins. New students are automatically registered for required courses. Continuing students register for classes online via the web. Through the registration process, students assume academic and financial responsibilities for the classes in which they enroll. They are relieved of these responsibilities only after formally terminating enrollment by dropping or withdrawing from classes in accordance with the procedures and deadlines specified in the Academic Calendar each semester.

REGISTRATION DEADLINES

Khalifa University of Science and Technology policies determine when students may enroll or adjust their enrollment in classes. The Registration Office has the most up to date information regarding these policies. The registration period and other important dates are published in the Academic Calendar section of the Catalog.

REGISTRATION HOLDS

Students will not be permitted to register if there is a "hold" on their registration record. Holds may be related to academic standing (probation or dismissal), non-academic offense violations (disciplinary), incomplete admission (missing transcripts), or financial issues. Holds may also be placed on students who are not UAE citizens or residents and have not submitted required immigration documentation. To clear a hold, the student must contact the office that has issued the hold to find out what must be done to fulfill the obligation(s.)



ACADEMIC ADVISING

To register each semester, students are required to meet with their faculty academic advisors to discuss their academic program and obtain their faculty advisor's approval for course selection. This process ensures that the student is on course to meet the graduation requirements of his or her degree program.

Academic advising is an integral aspect of academic progress and a shared responsibility between the student and academic advisor. Every student at the Khalifa University of Science and Technology from the time of their enrollment to graduation are assigned at least one academic advisor.

The student and advisor(s) must meet at least once a semester to ensure satisfactory and timely progress towards graduation. All students are provided an Academic Advising Guide document, which details the responsibilities and procedures. Advisors are assigned by the Academic Department and maintained through the Registrar's Office.

Academic advisors provide information about selecting courses and areas of specialization and are knowledgeable about regulations and requirements. They also provide resources, guidance, and support to enable students to explore, define, and realize their aspirations throughout their academic careers. With the benefit of academic advisors, University students acquire the knowledge needed to create and fulfill their educational plans and meet their goals for the future in a timely manner.

ACADEMIC ADVISING GUIDING PRINCIPLES

Both students and advisors have advising responsibilities. Advising is guided by the following principles:

- Effective academic advising can play an integral role in student development.
- Mutual respect and shared responsibility should govern the personal interactions between advisors and students.
- Students and advisors must prepare for, actively participate in, and take appropriate action following advising sessions.
- Advising information provided to students must be accurate, accessible, and timely.

- Academic advising should encourage students to explore many possibilities and broaden their educational experience
- Academic advising should encourage a positive attitude toward lifelong learning.
- Academic advising should use all available resources and means to provide advising tailored to the individual needs of students.
- Academic advisors should keep records of the advising sessions held with a student.

CHANGE OF ACADEMIC ADVISOR

A student may change advisor within the same department upon approval by the department chair (or designees). The department chair will notify the Registrar's Office of the approved change of advisor.

FACULTY OFFICE HOURS

Faculty office hours are allocated for students' consultation and advising. Faculty are required to show their office hours on their office doors. Students are encouraged to make use of these times for advising or for consulting with faculty on the courses they are teaching.

PLAN OF STUDY

The plan of a student for a major or minor outlines the minimum approved courses, internships, projects, and academic requirements that must be completed to be eligible to graduate. Plans of study change over time, and consequently students are required to follow the requirements of the approved plan that was in effect at the time of their admission to the academic major program or minor.

Students may petition the Department Chair for approval of changes to the prescribed plan of study. Small changes may be approved by the Department Chair. Significant changes require approval of the Department Chair and applicable University standing committee(s.) Please refer to the University's policy of Variation to Academic Program for additional information.



MANAGING COURSES

DROPPING/ADDING COURSES

Students may add, drop or change a course section at the beginning of a semester during the official add/drop period. Courses dropped during the official add/drop period will not appear on a student's official transcript.

COURSE RESTRICTIONS, PREREQUISITES AND CO-REQUISITES

Enrollment in some courses may be restricted. For example, a course may be restricted to students with a specific major or require that a student have Junior or Senior level standing. An instructor's approval may be required in some cases. These are referred to as "course restrictions".

A program of study may also require that courses be taken in a certain order or taken together. A course that is required to be taken before another course is called a "prerequisite". Students are not allowed to register for a course with a prerequisite unless the prerequisite course has been completed with a passing grade.

A "co-requisite" is a course that is designed to be taken together with another course.

- A co-requisite course may be satisfied if the student has previously completed it with a passing grade.
- Students may not drop a course if it is a co-requisite of another course in their schedule. In this case, both courses would have to be dropped.
- If a student repeats a co-requisite course in which the student earned a grade of C- or lower, the companion course (if passed) does not have to be repeated.

AUDITING COURSES

Subject to availability, admitted degree students may, with the approval of the Department Chair and the permission of the instructor, audit undergraduate courses without credit. The permission of the Department Chair and instructor must be obtained prior to registration, and the student must register as an auditor. Registration priority will be given to matriculated degree-seeking students.

Auditors are required to follow the same registration procedures as persons taking the course for credit. Auditors do not receive grades or credits. Participation in class discussion and written work is permitted at the discretion of the instructor. A fee per credit hour may be charged. The status of Auditor cannot be changed after the course has begun. The University reserves the right to cancel an audit registration if the class size is excessively large.

LIMITATION OF COURSES OFFERED

The University reserves the right to cancel a course even though it is listed in the Catalog or scheduled to be offered. Notification of a cancelled course will be sent to any affected students at their University email address.



WITHDRAWAL, DISCONTINUING AND RESUMING STUDIES

The Khalifa University of Science and Technology recognizes that personal circumstances may require that a student withdraw from a course or degree program either temporarily or permanently, and provides advice and guidance for doing so.

NATIONAL SERVICE LEAVE

Leave for national service is automatically granted. The student must return to the University in the semester immediately following the completion of national service.

COURSE WITHDRAWAL

Students are permitted to withdraw from degree courses during the official published withdrawal period. A grade of "W" will be assigned on the student's transcript. The grade of W will not affect a student's Grade Point Average (GPA). Students withdrawing from any course should discuss the decision with their instructor, academic advisor, and with a student counselor. Students should be aware that withdrawal from a course may have an impact on their scholarship terms and timely progress toward graduation.

All students are expected to maintain full-time status by carrying a minimum load of 12 credit hours per semester. A student who fails to complete 12 credit hours in a semester is issued an academic progress warning and may be required to meet with a counselor.

A student who withdraws from a course after the deadline for withdrawal has passed will be assigned a grade of WF (withdraw failing). The grade of WF is equivalent to an F (0.0 quality points), and is used in the calculation of the GPA (see ACA 3350 Grading System, GPA, and Course Repetition). Upon appeal, this grade may be changed to a WP.

TEMPORARY LEAVE OF ABSENCE AND RESUMING STUDIES

Under exceptional circumstances, students may apply for a Temporary Leave of Absence for a maximum of two semesters during their degree studies. Students should be aware that withdrawing will have an impact on their scholarship terms and timely progress toward graduation.

Generally, a student must be in good academic standing. A student in good academic standing is

normally allowed no more than two semesters leave of absence during their degree studies. The student must complete a Leave of Absence Request form and specify the reason for the leave. The Leave of Absence must be approved by the Dean of Academic Services. Students sponsored by non-KU agencies may not take leave of absence without their sponsor's approval.

To resume studies after a Temporary Leave of Absence, a student must contact the Registrar's Office to request reactivation.

A student who does not return from a Temporary Leave of Absence by the date specified in the leave request is dismissed from the university.

PERMANENT WITHDRAWAL FROM THE UNIVERSITY

A student may voluntarily withdraw from the University in accordance with withdrawal clearance procedures. Students who voluntarily withdraw are subject to the terms and conditions of their scholarship agreement or undertaking.

Any student voluntarily leaving the University before the close of the term must withdraw officially and complete the withdrawal clearance process.

A student initiates the withdrawal procedure by filing a completed "Temporary/Permanent Withdrawal Request" form at the Registrar's Office. A withdrawal is effective on the date the form is received by the Registrar's Office.

No record of enrollment in courses will appear on the transcript of a student who withdraws from all degree courses during the official add/drop period. A student who withdraws from the university before the deadline for course withdrawal, but after the official add/drop period, will receive a grade of W for all courses in progress. Students withdrawing after the deadline and before the last day of classes will receive a WF in each course. The student has the right to appeal a grade of WF as per the provisions of STL 5450 Student Grievances and Appeals. In cases of a successful appeal, a grade of WP will be assigned.

Any student who leaves the university before the close of a semester without withdrawing officially will receive a failing grade of F in each course for which the student was registered.



ACADEMIC YEAR

The academic year at the Khalifa University of Science and Technology consists of two regular semesters and a summer term. The two regular semesters which are referred to as the fall semester and the spring semester, consist of 15 weeks of teaching and final examinations period. The summer term lasts for five to six weeks of teaching. In the summer, a three-credit course meets for 75-90 minutes per day, five days per week. Due to the intense nature of summer coursework, students may take no more than two courses or six credits. In exceptional circumstances, the dean may allow a student to register for seven credits.



ACADEMIC CREDIT SYSTEM

The unit of measurement of academic work at the Khalifa University of Science and Technology is the credit hour. It ordinarily represents one lecture hour per week for one semester. A lecture hour has a nominal duration of fifty minutes. A sequence of three laboratory hours per week or two hours of problem solving sessions per week are considered to be the equivalent of one credit hour. Credit hours are also referred to as credits or semester credit hours.

LANGUAGE OF INSTRUCTION AND EXAMINATION

English is the official language of the Khalifa University of Science and Technology. All courses at the University are taught and examined in English apart from non-English content courses such as Arabic language.

TOTAL DEGREE CREDITS AND SEMESTER LOAD

Students are required to make steady progress towards their degree requirements within the maximum allowable time. The total degree credits required to complete the University's undergraduate degree programs will vary but in no case will they be less than 120 semester hours.

The appropriate course load for an undergraduate is dependent on two factors: scholastic ability, as reflected by the student's academic history, and available study time. Successful academic achievement usually requires two to three hours of outside study for each hour spent in class. For example, enrollment in 16 credit hours would require about 32-48 hours of outside preparation per week.

A credit load of 15-18 credit hours constitutes a normal full semester program for an undergraduate student. A student must normally complete 15-18 credit hours per semester to finish a Bachelor's degree in four years.

The maximum load in a semester is 19 credit hours. The maximum credit load in a summer session is 6 credit hours.

Enrollment in more than 19 credit hours, to a maximum of 21 hours in a semester, requires advance written approval of the relevant Dean (or

designee.) Enrollment in more than 6 credit hours to an absolute maximum of 7 in a summer session requires advance written approval of the relevant Dean (or designee.)

COURSE TITLE, CODE, CREDIT VALUE AND DESCRIPTION

Each course offered at the University has a unique code, title and credit value. A list of courses offered may be found in this Catalog. In addition, the Catalog contains a brief description of the course content and any required prerequisites or co-requisites. The course code consists of three or four letters that reflect its discipline or field of study, followed by a three-digit number that indicates its level. The title of the course gives an indication of its content. The credit value of the course has three numbers; the first one gives the number of lecture hours per week, the second shows the number of laboratory or problem solving hours per week, and the third one gives the overall credit value of the course which will contribute to the particular degree requirements. The example below further explains the course code and value information.

- PHYS** Letter part of the code
- 101** Numeric part of the code
- GENERAL PHYSICS I** Course title
- (3-3-4)** Lecture hours per week
Laboratory hours per week
Overall credit value

STUDENT CLASSIFICATION, FULL AND PART-TIME STATUS

Undergraduate students admitted to a Bachelor's degree program are classified based on earned semester credit hours:

EARNED CREDIT HOURS	CLASSIFICATION
0-29	Freshman
30-59	Sophomore
60-89	Junior
90+	Senior

GRADUATION RESIDENCY REQUIREMENTS

Students must successfully achieve the following to complete the requirements for a bachelor's degree:

- Complete all coursework in a degree program sequence as published in the student's academic catalog of record within six years of first enrollment at Khalifa University of Science and Technology (KU) as a degree student;
- Under certain circumstances, a course substitution may be allowed. If approved, the "Course Substitution" Form is submitted to the Registrar's Office in order to update the student's degree audit in the Student Information System. All substitutions must be approved by the student's degree program (department chair) and the dean of the relevant college (or designee).
- Have a minimum cumulative grade point average of 2.00 for all academic work completed in residence (excluding foundation program courses);
- A minimum of 50 percent of the academic credit applied toward graduation must be earned from courses taken at KU (See ACA 3270 Transfer Credits and Advanced Standing);
- Have a minimum of 30 credit hours in 300 and 400 level courses at KU;
- Recommendation by the faculty and approval of the Board of Trustees.
- Students should register for a normal credit load as appropriate, keeping in mind that exceptions to the maximum allowable credit load will require approval of the dean (or designee).
- Students should consult with their academic advisor for information on specific credit hour requirements. Continuous consultation with the academic advisor is essential, as it will also enable the student to complete the required degree credits within four years.





GRADES AND GRADE POINT AVERAGES

POLICY AND GRADING SCALES

Grades are an important component of the learning assessment process (refer to ACA 3300 Assessment of Student Learning). It is the responsibility of the course instructor to inform each class at the beginning of the semester or session of the nature of the course assessment and corresponding grades assigned. Each course instructor should include a grading metric in the course syllabus. The following grades and guidelines are used at the KU:

For undergraduate programs :

LETTER GRADE	GRADE POINT	DESCRIPTION
A	4	Excellent
A-	3.7	Very Good
B+	3.3	Good
B	3	
B-	2.7	Satisfactory
C+	2.3	
C	2	Less Than Satisfactory
C-	1.7	
D	1	Poor
F	0	Fail
WF	0	Withdrew Failing

Additional letter grades are used to denote special cases. These letter grades do not have corresponding grade points, and hence are not used in calculating a student's grade point average.

W
Withdrew between end of late registration and deadline for course withdrawal.

WP
Withdrew Passing after the deadline for course withdrawal through the last day of classes. A WP grade must be approved by the dean (or designee).

WA
Administratively withdrawn due to absences.

S
Satisfactory in a Pass/Fail course.

U
Unsatisfactory (denotes failing in a Pass/Fail course)

I
Incomplete* (See Below)

IP
In Progress (May be assigned prior to a final grade in a multi-course sequence.)

AUD
Audit

EX
Student Exempt from a Course (No credit given.)

TR
Transfer (Credit counted.)

N
No Grade Submitted

XF
Failure Due to Academic Dishonesty (This grade can only be assigned after an academic dishonesty hearing. A student may petition to change this grade to F.)

GRADE POINT AVERAGE (GPA)

The grade point average is the ratio of the total number of quality points earned to the total number of credit hours attempted. Both semester GPA (SGPA) and CGPA (CGPA) appear on the transcript.

INCOMPLETE GRADES

The incomplete grade is an exceptional grade that can only be assigned when a student has satisfactorily completed a major portion of the work in a course but, for non-academic reasons beyond the student's control and deemed to be acceptable in accordance with university regulations, was unable to meet the full requirements of the course.

- Approval by the college dean (or designee) must be secured by the instructor before a grade of "I" may be assigned or changed.
- An incomplete grade assigned in a course must be removed and the grade change submitted by no later than the end of the first week of classes in the term immediately following. Failure to remove the "I" grade by this deadline will result in the "I" grade changing to "F".
- It is the student's responsibility to meet with the faculty member and request arrangements for the completion of the missing required coursework.
- Once course requirements are completed a request for grade change must be made by the instructor as stipulated in para 5.3.

REPETITION OF COURSES

A student should meet with his/her advisor and appropriate KU departments before repeating a course, as it may affect the student's academic standing and scholarship. A repeated course must be taken when it is regularly offered and cannot be taken in independent or individual format. Any questions regarding these procedures should be addressed to the Registrar's Office. A student may repeat a course subject to the following:

- A student may repeat a course for which the student received a letter grade of C- or lower;
- A student is allowed to repeat degree courses for a maximum of seven times during the student's undergraduate studies at the university;
- Degree credit for a course is only given once, but the grade assigned each time the course is taken is permanently recorded on the transcript;
- Only the highest grade earned for a repeated course will be used in calculating the grade point average;

- Students may not repeat a course by taking it in transfer at another university;
- A student who wishes to take a course for a third time must obtain the approval of the college dean. A student who fails a required course more than twice is subject to dismissal for failure to make satisfactory academic progress toward the student's degree (refer to ACA 3600 Academic Standing and Honors).

GRADE CHANGES AND APPEALS

Final course grades, officially reported by the instructor at the end of an academic semester or summer term, are recorded by the Registrar's Office. A request to change a grade may be initiated, in writing, by the instructor of the course or, following a student submitted Grade Appeal form, by the Student Appeals Committee.

A student may appeal an officially recorded grade through submission of a "Grade Appeal" form to the Registrar's Office no later than the first day of classes of the next regular semester. A grade appeal will be processed as per the provisions in STL 5450 Student Grievances and Appeals.





ATTENDANCE

The Khalifa University of Science and Technology students are required to attend classes regularly to progress academically. All faculty members are required to maintain accurate and up-to-date records of student attendance.

INSTITUTIONAL SANCTIONS

The following shall apply when a student has been absent, either excused or unexcused, for more than 20% of scheduled class meetings in which s/he is currently enrolled (including excused absences).

- If the 20% limit is reached on or before the last day to withdraw from classes, as specified in the academic calendar, then the Student Information System will automatically assign a letter grade of WA (Withdrawn Administratively).
- In all other cases a letter grade of WF (Withdrawn after Deadline) will be assigned.
- All appeals should be referred to the Student Appeals Committee which will provide a recommendation to the chief academic officer whose decision shall be final. Students applying for an appeal must provide all necessary documentation within three days of the grade (WA or WF) notification.

EXCUSED ABSENCE

Excused absences: Official approval from Student Success is the only means of excusing a student's absence. The following provisions apply:

- It is the student's responsibility to apply for an absence to be excused. Once the application is approved, Student Success shall inform the instructor.
- Medical certificates, personal correspondence and other documentation may not be accepted by instructors as excusing a student's absence. Instead, these should be provided by the student to Student Success who are the final arbiter in matters regarding the collection, dissemination and review of all required documentation subject to the provisions of ACA 3850 Confidentiality and Privacy of Student Records shall apply.
- The decision by Student Success to grant or decline a student's application to excuse his/her absence is final subject to the provisions regarding appeals in 5.2.2.3 above.
- When possible, students should seek prior approval for an excused absence.

- In the case of students representing KU on official business (KU-related travel, conferences, school recruiting, presentations, fieldtrips, etc.) the following provisions shall apply:

Approval must be obtained prior to the absence from student's department chair who shall then inform Student Success and the instructor(s) of the course(s) from which the student will be absent.

All other provisions shall apply.

- Application to excuse an absence post facto must be made to Student Success within five (5) working days of the last day of the period of absence for which application to excuse is made.
- Where an excused absence causes a student to miss an assessment then the student's grade for the assessment shall be calculated in accordance with the course syllabus. Unexcused absences that cause a student to miss an assessment will result in that student receiving a grade of zero (0) for the missed assessment with a concomitant effect upon the student's final grade. Refer to ACA 3370 Examinations, ACA 3350 Grading Systems, GPA and Course Repetition, ACA 3200 Graduation Requirements and Academic Progress (Undergraduate).

LEAVE OF ABSENCE AND REINSTATEMENT

A leave of absence can interrupt a student's studies and delay the completion of degree requirements. Such leaves shall only be granted for good cause.

- Generally, a student must be in good academic standing. A student in good academic standing is allowed no more than two consecutive semesters leave of absence. The student must complete a Leave of Absence form at the Registration Office. The leave of absence must be approved by the Registrar who may grant exceptions in those cases when the student is not in good academic standing or conduct standing.
- A student may apply for a leave of absence once throughout the duration of his/her undergraduate study at the University.
- To resume studies after a leave of absence a student must complete a Reactivation form at the Registration Office.



EVALUATION AND EXAMINATIONS

ASSESSMENT OF STUDENT LEARNING

Achievement levels of intended learning outcomes shall be evaluated through a variety of assessment instruments in a process of frequent assessment that includes regular and timely feedback to students regarding their performance.

Course policies regarding the submission, grading, return and weighting of all assessment instruments must be clearly communicated in the course syllabus, which is to be shared with students on the first day of class.

EXAMINATIONS

One or more major examinations may be administered for a course to assess achievement of learning outcomes. All examinations at the Khalifa University of Science and Technology must follow clear and established guidelines to ensure examination integrity and compliance with best practices.

Major examinations shall be included in the course syllabus and any changes communicated to students in advance. Final examinations are scheduled through the Registrar's Office.

RECORDS AND TRANSCRIPTS

A permanent academic record for each student enrolled in the University is maintained in the Registration Office. The written consent of the student is officially required to disclose his/her academic record. Exceptions are made for parents, sponsors, and authorized University officials and in compliance with a judicial order.

Students may obtain official transcripts of their academic records from the Registration Office. A transcript will only be released with a signed request from the student concerned.

ACADEMIC STANDING

The Khalifa University of Science and Technology actively monitors each student's academic standing and communicates the information on a periodic basis. Academic standing is based on the student's CGPA and indicates if a student is meeting the University's standard for expected academic performance. Academic excellence, rigorous scholarship, demonstrated attainment of learning outcomes and timely progress towards graduation are critical components and measures of student intellectual development and academic success.

ACADEMIC HONORS

The President's List is reserved for students with the very highest levels of achievement who:

- During the preceding semester earned a semester grade point average of 3.80 or higher while completing a minimum of 12 credit hours that includes no incomplete grades or repeated courses;
- Are not on academic probation or subject to any disciplinary action.

The President's List acknowledgement will be posted on the student's transcript.

The Dean's List is reserved for students who demonstrate a level of achievement significantly above the norm who:

- During the preceding semester earned a semester grade point average of 3.50-3.79 while completing a minimum of 12 credit hours that includes no incomplete grades or repeated courses;
- Are not on academic probation or subject to any disciplinary action.

The Dean's List acknowledgement will be posted on the student's transcript.

ACADEMIC GOOD STANDING

Students are in good academic standing as long as they maintain a CGPA of 2.00 or higher.

ACADEMIC PROBATION

A student whose CGPA falls below 2.00 is placed on Academic Probation for the next regular semester and a note is made on the student's transcript. The following provisions apply for a student on Academic Probation:

- Unless otherwise approved by the Vice President of Academic Affairs, a full-time student on probation is only allowed to register for a maximum of 13 credit hours per regular semester;
- While on probation, a student may not take any course on a Pass/Fail basis;
- A student who is placed on probation may be required to enroll in developmental courses or workshops.

If, at the end of the semester, the student has attained a CGPA of 2.00 or above, he/she shall return to good standing.

If, at the end of the semester, the student's CGPA remains below 2.0, he/she will remain on probation for the following regular semester.

ACADEMIC DISMISSAL

A student in the second consecutive regular semester of probation who, at the end of that semester, fails to attain a CGPA of 2.00 shall be academically dismissed from the University.



STUDENT RIGHTS AND RESPONSIBILITIES

ACADEMIC INTEGRITY

The Khalifa University of Science and Technology is committed to the principles of truth and academic honesty. It is the responsibility of all University community members – students, faculty, staff and administration alike – to promote academic integrity through active deterrence and reporting of violations.

STUDENT ACADEMIC RIGHTS

Every enrolled student has the right to access and receive quality education.

- KU is obliged to provide students with information on available funds and financial aid.
- KU is obliged to uphold and preserve its students' rights to exercise principles of academic freedom.
- KU is obliged to advise on and provide sufficient course information to permit students to make informed course selections.
- KU is obliged to make each course outline available to students including (but not limited to):
 - » A description of the topics to be considered in the course;
 - » Objectives and learning outcomes;
 - » A list of all required readings and other materials, a description of the means of evaluation to be used in the course, the instructor's office hours, and locations for office appointments.
- Instructors are obliged to clearly communicate the learning outcomes and assessment tools to students.
- Instructors are obliged to provide a fair and reasonable evaluation of a student's performance in a course, with evaluation measures reflecting the content of the course.
- The students have the right to a fair and impartial assessment of their performance.
- Subject to reasonable administrative arrangements and provided that a request is made by a student within a reasonable time after the notification of a decision, students have the right to appeal an academic decision.

STUDENT RESPONSIBILITIES

Khalifa University of Science and Technology espouses a simple statement of student conduct which is expected of all students in the university

community. This statement is as follows: *"Whether engaging in university activities or engaging in their lives outside the university, students at Khalifa University of Science and Technology are expected to show respect for order, morality, personal honor and the rights of others as is demanded of good citizens. This includes conforming to applicable laws and respect at all times for the cultural norms and expectations of the society we live in. Failure to do this will be sufficient cause for removal from the University."*

- More specifically, a student is responsible for:
 - » Abiding by all academic policies and procedures, and adhering to the academic integrity policy (including work ethics, attendance, etc.);
 - » Conforming to all non-academic administrative rules and regulations (including those related to health, safety and environment);
 - » Conducting oneself in accordance with the Student Code of Conduct.
- All students are obliged to abide by the following rules of general conduct:
- Respect the norms of UAE society and behave in a way that does not offend cultural sensitivities (see STL 5410 Student Code of Conduct).
- Observe decency in conduct and behavior, whether the student is on campus or off campus. (see STL 5410 Student Code of Conduct).
- Adhere to the appearance appropriate to university students. Give special attention to clothing and cleanliness. Ensure that clothes do not conflict with public morals (see STL 5430 Student Dress Code).
- Abide by all academic policies and procedures and conform to all non-academic administrative rules and regulations.
- Complete his/her academic program. This includes being familiar with KU catalogs, maintaining good academic standing, and meeting all other degree requirements.
- Abide by KU attendance policy (see ACA 3550 Student Attendance).
- Maintain communication with KU and keep accurate student information including current address, home address, telephone number and e-mail address etc.
- Keep their ID card with them at all times and present it on demand to university personnel.

- Participate in campus and community life in a manner that will reflect credit upon the student and the university.
- Be punctual in attending lectures, labs, workshops and events.
- Be an active listener while in any educational setting and avoid any disruption.
- Maintain the cleanliness and tidiness of KU facilities.
- Refrain from using, circulating or displaying pamphlets, leaflets or posters in KU premises without prior approval.
- Smoke only in designated smoking areas in KU.
- Assume responsibility of all resources such as apparatus, equipment, computer, books and other provided materials.
- Refrain from using any university computer for games or other purposes not related to the educational programs.
- Park only in the designated areas. Students are not allowed to use the parking area designated for faculty and staff.
- Be fully responsible for personal property. KU shall bear no responsibility for any lost or missing items.
- Consume food only in designated dining facilities. Food, tableware and utensils cannot be removed without permission.
- Refrain from engaging in spreading rumors or making false accusations.
- In case of a fire alarm, follow the instructions of the safety and security staff and leave KU premises as quickly as possible.
- Respect payment deadlines.
- Irrespective of religion or nationality, behave and dress in a modest manner. Harassment or intimidation of students will not be tolerated and students should report any such cases to the Student Services Office.

CONFIDENTIALITY AND PRIVACY OF STUDENT RECORDS

Khalifa University of Science and Technology (KU) creates and maintains a variety of records for prospective, current and former students. Documents submitted by students become the property of the university including, but not limited to application / enrollment forms, school certificates, academic or other transcripts and English language test scores.

- Current and former students, their guardians and/or sponsors have access to the student's academic records upon written request to the Registrar's Office and provision of valid identification in accordance with the stipulations herein.
- University faculty and staff are permitted to access a student's academic record only when necessary to the performance of their assigned duties and responsibilities.

Current and former students, their guardians and/or sponsors have access to the student's academic records upon written request to the Registrar's Office and provision of valid identification in accordance with the Confidentiality and Privacy of Student Records policy. Other parties may be given limited access to student academic records as follows:

- Organizations, their employees, agents and/or representatives authorized to act on the University's behalf or providing a service or function for or on behalf of the University may have access such as may reasonably be considered necessary to the service or function;
- Government and other authorized officials including accrediting bodies;
- To comply with a judicial order;
- Other institutions to which a student is transferring;
- Organizations conducting educational studies, on the condition that no personally identifiable information is released, or is released only in aggregate form;
- University employees, agents or representatives investigating a suspected security breach or conduct violation;
- Emergency personnel where there is a health or safety concern.
- A student, guardian, or sponsor has the right to request changes to the content of the student's education record if the content is considered to be inaccurate, misleading, or in violation of the student's privacy or other rights. Such a request should be submitted in writing to the Registrar's Office.

STUDENT ACADEMIC REGULATIONS AND POLICIES

ACADEMIC INTEGRITY CODE

The academic community, like all communities, functions best when all its members treat one another with honesty, fairness, respect, and trust. The Khalifa University of Science and Technology expects high standards of scholarship and integrity from all members of its community. To accomplish its mission of providing an optimal educational environment and developing leaders of society, the University promotes the assumption of personal responsibility and integrity and prohibits all forms of academic dishonesty. The purpose of education is to develop a student's ability to think logically and to express himself/ herself accurately.

Members of the University community are expected to carry out their work with intellectual honesty and professional integrity, adhering to the highest standards of ethical behavior consistent with the codes of conduct set down by relevant professional societies. Unethical behavior is not worthy of members of the University community and will be dealt with severely.

Academic dishonesty in any form undermines the very foundations of higher education and will not be tolerated by the University. The most common form of academic dishonesty is plagiarism. Other forms of academic dishonesty are described in the sections below.

PLAGIARISM

Representing another's words or ideas as one's own or failing to give appropriate credit to outside sources of information in any academic assignment, exercise, examination, project, presentation, report, etc.

FORMS OF PLAGIARISM

1. Word-for-word copying of someone else's work, in whole or in part, without acknowledgment, whether that work be a magazine article, a portion of a book, a newspaper piece, another student's paper, or any other composition not your own, is considered a form of plagiarism. Any such use of another's work must be acknowledged by:

- Enclosing all such copied portions in quotation grades.
 - Giving the original source either in the body of the paper or in a note. As a general rule, one should make very little use of quoted matter in papers, project reports, and assignments.
2. An unacknowledged paraphrasing of the structure and language of another person's work is a form of plagiarism. Changing a few words of another's composition, omitting a few sentences, or changing their order does not constitute original composition and therefore can be given no credit. If such borrowing or paraphrasing is ever necessary, the source must be indicated by appropriate reference.
 3. Writing a paper based solely on the ideas of another person is a form of plagiarism. Even though the language is not the same, if the thinking is clearly not one's own, then the person has committed plagiarism. If, for example, in writing a paper a student reproduces the structure and progression of ideas in an essay one has read, or a speech one has heard, the student, in this case, is not engaging his/her own mind and experience enough to claim credit for writing his/her own composition.

In summary, plagiarism includes, but is not limited to:

1. Using published work without referencing (the most common);
2. Copying coursework;
3. Collaborating with any other person when the work is supposed to be individual;
4. Taking another person's computer file/program;
5. Submitting another person's work as one's own;
6. The use of unacknowledged material published on the web;
7. Purchase of model assignments from whatever source;
8. Copying another student's results.

AVOIDING PLAGIARISM

To avoid plagiarism, a student must give credit whenever he or she uses:

1. Another person's idea, opinion, or theory;
2. Any facts, statistics, graphs, drawings, any pieces of information that are not common knowledge;

3. Quotations of another person's actual spoken or written words; or
4. Paraphrase of another person's spoken or written words.

Direct quotations should be put in "inverted commas", and referenced. Paraphrased or edited versions should be acknowledged and referenced.

IDENTIFICATION AND ANALYSIS OF PLAGIARISM GUIDELINES

It is University policy that electronically-submitted coursework produced by students be regularly submitted to suitable plagiarism-detection software for the identification and analysis of possible plagiarism. The University holds a site license for reputable plagiarism-detection software and makes available to all teaching staff relevant access to the software. It is mandatory that all teaching staff use such software for all major student assignments and final project reports. Plagiarism is deemed to have occurred if the plagiarism score is equal to or greater than 15%, after all individual instances of scores of 2% or less are discounted.

All coursework items that achieve a plagiarism score equal to or greater than 15% (after all individual instances of scores of 2% or less are discounted) will be awarded zero grades, subject to the following rider: For Senior students only, where a piece of coursework or the final project report attains a plagiarism score between 15% and 17% (after all individual instances of scores of 2% or less are discounted), the report must be reviewed by the relevant instructor and a decision made jointly by the relevant instructor and the Department Chair as to the final score that will be recorded.

The only faculty member who may submit a coursework item for a particular course to a plagiarism-detection software program is the assigned instructor for that course. No other academic course member should submit any coursework item that relates to another faculty member's assigned course.

OTHER FORMS OF ACADEMIC DISHONESTY

CHEATING

Using or attempting to use unauthorized materials and/or assistance in any academic assignment, exercise, examination, project, presentation, report, etc. This includes the possession of a mobile phone or any other unauthorized electronic devices during a test or an examination.

COLLUSION

Collusion includes cooperation of student(s) with faculty or staff personnel in securing confidential information/material (tests, examinations, etc.); bribery by student(s) to change examination grades and/or grade point average(s); cooperative efforts by student(s) and student assistant(s) to gain access to examinations or answers to examinations for distribution; seeking, obtaining, possessing, or giving to another person an examination or portions of an examination (not yet given), without permission of the instructor.

FABRICATION OF DATA

Falsifying or inventing research, citations, or any information on any academic assignment, exercise, examination, project, presentation, report, etc.

FALSIFICATION OF RESULTS

This means the alteration, modification, or misrepresentation of results (including selective inclusion or exclusion of results).

FALSIFYING SIGNATURES

Forging monograms, imprimaturs and other forms of authorization or identification – whether hand-written, electronic or otherwise – on official forms or documents, attendance lists or any academic assignment, exercise, examination, project, presentation, report, etc.

RECYCLING

Recycling is the submission of one's previous work to count as new work. For example, submission of a student's work that has previously counted in another unit of study is not allowed, unless explicitly authorized by the faculty members of both study units. In such case, students must reference their previous work.

SABOTAGE

Destruction of, or deliberate inhibition of, the progress of another student's work related to a course is considered sabotage and is viewed as academically dishonest. This includes the destruction or hiding of shared resources such as library materials and computer software and hardware to tampering with another person's laboratory experiments.

PROCEDURES AND PENALTIES FOR ACADEMIC INTEGRITY CODE OFFENSES

If an instructor suspects that a student has committed a major violation, s/he should meet with the student to discuss the allegation. The meeting must take place within three (3) working days from when the alleged violation was identified.

- If the instructor determines that no academic violation has occurred, the matter is dropped.
- If the instructor determines that a major violation has occurred, s/he shall notify the student, the instructor's department chair, and the relevant college dean in writing, detailing the violation within five (5) working days from when the meeting with the student(s) took place.
- The student will be notified in writing of the incident in question and the policy violation(s) under consideration. The notice (typically sent via email) will be delivered sufficiently in advance of the hearing to afford a reasonable opportunity to prepare a presentation and have access to the case file.
- The student's file will be automatically referred to the Judicial Officer (or designee) who will review the case, gather the evidence and present it, in writing, to the AIC.
- Upon submission of the case to the AIC,
 - » The AIC will hold a meeting with the Judicial Officer (or designee) and, if necessary, the student and/or instructor for the purpose of examining the evidence and questioning any witnesses or relevant parties.
 - » The student shall have the right to be assisted by an advocate. The advocacy role may be assigned to an academic advisor or counselor. External attorneys are not

permitted to be involved in any grievance or appeal case.

- » The committee may consult the university legal assessors or an expert (e.g., medical, psychological, etc.) for advice regarding any evidentiary issue.
- » Based on the evidence, if the AIC decides that the student has committed an academic violation, they will recommend an appropriate sanction. The AIC may recommend any sanction in accordance with para 5.6 of this document.
- » The AIC submits a full report, including the recommended sanction, to the provost (or designee) for a final decision. Such decision will be communicated to the Registrar's Office. Where the provost (or designee) determines to impose a sanction other than that recommended by the AIC, written justification shall be provided to the AIC.
- » The Registrar's Office will communicate the final decision to the student, the instructor, the department chair, and the relevant college dean

INVESTIGATION AND PENALTIES BY THE HEARING COMMITTEE

The offence is referred to a Hearing Committee in the following cases:

- I. If the case represents a student's first offense and the student either did not admit guilt or wishes to appeal the sanction imposed by the instructor;
 - II. If the case represents a student's first offense and the student admitted guilt but the instructor decided that the offence is serious and warrants a greater sanction than the list of penalties that he/she has the authority to impose;
 - III. If the student has had a previous offence.
1. The Hearing Committee is an ad-hoc University committee appointed by the Provost (or designee) and is comprised of Senior faculty and staff members who are independent of the student and the case. The Provost (or designee) shall designate a Chair for the hearing.

2. The committee shall meet as directed by the chair to review all statements and supporting materials and to determine whether an act of academic dishonesty occurred. The committee may also request additional information and/or interview individuals who may have information relevant to the incident, including the instructor(s) who made the referral and the student involved.
3. The hearing should be conducted in such a manner as to do substantial justice and not be restricted unduly by rules of procedure. The focus of inquiry shall be the validity or invalidity of the accusations against those accused of violating the Academic Integrity Code.
4. The meeting shall be private to protect the confidentiality of the proceeding.
5. The accused student may challenge any member of the committee on grounds of prejudice. The committee shall deliberate in private and determine, by majority vote (excluding the member being challenged), whether the member should be replaced by an alternate committee member who will be designated by the Chair.
6. The student shall have the right to be assisted by an adviser of the student's choice, who must be a full-time staff member or a full-time faculty member. Attorneys are not permitted to attend the hearing. The adviser, upon request of the student, may:
 - a. Advise the student in the preparation of the student's case;
 - b. Accompany the student to the hearing;
 - c. Assist the student in questioning witnesses.
 - d. Advise the student in the preparation of an appeal;
7. At the onset of the hearing, the Chair confirms that the referred student(s) understands his/her rights.
8. If the student fails, without reasonable excuse, to attend the hearing, the committee may proceed with the hearing in the student's absence or, at the Chair's discretion, postpone the start of the hearing.
9. The Instructor shall, at the outset of the hearing, and in the presence of the student, apprise the committee of the facts and allegations of the case and the names of the witnesses who are to be presented to establish said factors and allegations. The student may make a summary statement in response.
10. All witnesses shall be heard by the committee in the presence of the student. The student and the student's advisor may put questions to the witnesses and shall have access to any documents considered by the committee as evidence in the case.
11. The student shall be afforded an opportunity to speak on his/her own behalf and to present witnesses. Should the student decide to speak, he/she will be subject to questions from the committee. The committee may consult legal assessors for advice regarding any evidentiary or procedural issue that arises during the hearing.
12. Following the hearing, the Committee will make a determination based on the facts/circumstances of the case. Depending upon the Committee's findings, it may take one of the following actions:
 - a. Dismiss the case; or
 - b. Impose a penalty based on "case history" and clear, convincing, and reliable evidence in support of the charge. This may include, but is not limited to, the following:
 - » Counseling the student and issuing him/her a formal written warning;
 - » Requiring the student to resubmit the work or to undertake another form of assessment in lieu of the work in question, with a capped pass grade;
 - » Giving a grade of zero for the work (in cases involving plagiarism, the issuance of a grade of zero is normally mandatory as detailed in the Identification and Analysis of Plagiarism Guidelines section of this Volume);
 - » Failing the student in the relevant course;
 - » Failing the student in all courses for the semester during which the academic misconduct has occurred;
 - » Suspending the student from the University for a given period of time. Suspension shall entail the withdrawal of such University privileges as are specified by the party or the hearing body imposing the suspension. If no particular privileges are specified, suspension shall entail the withdrawal of all University privileges, including the right to enter and be upon University property, in

- which case the student, during suspension, may only come upon University property for a specified purpose, previously authorized in writing by the Chair of the Committee that imposed the disciplinary action. Violation of the terms of the suspension shall result in the case being referred by the University Registrar to the Provost for further action if required.
 - » Dismissing the student from the University. Dismissal from the University for academic misconduct reasons entails the termination of all the student's rights and privileges as a student at the University. No application for re-admission by a dismissed student will be entertained by the University for a minimum of two years from the dismissal. Dismissal will be recorded on the academic transcript of the student.
 - » Expelling the student from the University. Expulsion from the University entails the termination of all the student's rights and privileges as a student at the University. The University will not entertain any application from an expelled student for re-admission. Expulsion will be recorded on the academic transcript of the student
13. In cases of penalties resulting in immediate suspension or expulsion, the student shall physically leave University-owned or controlled property within 24 hours after being informed of the sanction by the committee. The student may return to University-owned or controlled property during the terms of the suspension, dismissal or expulsion for the express purpose of attending the appeal hearing (if applicable) or for completing total separation requirements. Suspended students shall also be permitted to take examination(s) or submit paper(s) during the suspension, but the University may make special arrangements as to time and place for the completion of such work.
14. The chair of the committee will notify the student of the committee's decision in writing within five business days. The student will also be informed in writing of the right to file a final written appeal to the Provost within five business days of receipt of the Committee decision. The Committee shall write a brief report detailing the case and its decision. A copy of the report shall be submitted to the Dean / Vice Provost for Graduate Studies and Research (for graduate students) for inclusion in the student's file.
15. In the absence of an appeal, the decision of the committee shall be implemented immediately. In the event of an appeal, implementation of the committee decision will be suspended until a decision on the appeal is rendered by the Provost. The Provost's decision is final.
16. An annual report of the disciplinary activities and actions shall be prepared by the University Registrar and presented to the Provost and the President annually. However, in any description, no mention shall be made of the names of the parties or of any information which might lead to their identification.



STUDENT SERVICES DIVISION

The Office of Student Services is dedicated to providing quality services and support for students on- and off-campus. The Office advocates for students' needs, facilitates student involvement in their learning and personal development, and supports students as they accept responsibilities associated with membership in a campus community. Operating within the framework of one of the enablers to student development, the Office is committed to promoting a caring, cooperative and enriching campus environment that values diversity and appreciates the dignity of all people.

CAMPUS LIFE AND RESIDENCE LIFE

Students at the Khalifa University of Sciences and Technology are encouraged to participate in curricular as well as co-curricular activities. The University wants students to be engaged in a variety of educational, recreational, cultural and social activities to develop their personal and professional talents and interests. Students are provided with facilities such as meeting rooms, student lounges, activity rooms, TV rooms, and prayer rooms. In addition, the University provides on-campus services tailored to the needs of its students such as personal and career counseling and a nurse/health educator. The aim is to promote a campus climate that enhances the educational, physical, social, and emotional well-being of students, and creates a collaborative, caring, and participative academic environment.

CO-EDUCATION

The University maintains a multi-cultural and multi-structural educational environment that offers both an integrated and segregated education experience. All members of the community affirm the norms of UAE society and behave in ways that respects cultural sensitivities. All students, whether male or female, have access to equal educational opportunities and facilities.

RESIDENTIAL LIFE

The Khalifa University of Science and Technology provides residence facilities to all students from outside Abu Dhabi and its suburbs, including but not limited to Al Ain, the Western Region, and the Northern Emirates. The University also offers Abu Dhabi students a residence space on a case-by-case basis and availability. The University is committed to providing a clean, safe and quiet environment to ensure a comfortable on-campus life. The University

also contributes to providing a supportive residential life program to enrich an on-campus experience. Student residents are required to adhere to the applicable residence life policies.

HEALTH SERVICES

Health care services are available on-campus for all students. Students are required to have valid health insurance coverage.

EMERGENCY SERVICES

Security and emergency services are provided by the campus security department, which operates 24 hours daily. These services can be requested by calling or contacting the security office.

CAMPUS FOOD SERVICES

Food services are available at the three Abu Dhabi campuses, including full meals and snack items. There are a variety of food venue options at reasonable rates at the Main Campus, Sas Al Nakhl Campus and Masdar City Campus.

MOSQUE AND PRAYER FACILITIES

The Khalifa University of Science and Technology provides separate prayer rooms for men and women, including separate areas for wudhu ablutions.

RECREATIONAL FACILITIES

Recreational facilities including gyms, sports courts, swimming pool, and playing fields, are available across the University campuses, some with separate availability for men and women. Other venues may be leased on a "current needs" basis.

CAMPUS ACCESS

The Khalifa University of Science and Technology staff, faculty and students are eligible to access University facilities during official working hours. University ID is used to control access and must be kept available when on campus.

Staff, faculty and students who have a valid University parking sticker are eligible to bring their vehicles on campus, subject to specific campus conditions and regulations.

Access to laboratories and other specialized facilities, and after-hours access, require special advance permissions according to the applicable policies.



CENTER FOR EXCELLENCE IN TEACHING AND LEARNING

The Center for Excellence in Learning and Teaching (CELT) is a campus-wide unit focused on enhancing undergraduate science, technology, engineering and mathematics (STEM) education. The mission of CELT is to promote the professional enhancement of faculty by providing formal and informal forums for exchange of experience and expertise in order to enhance STEM education. The center organizes seminars and workshops and facilitates a number of Faculty Learning Communities such as Teaching with Technology and Active Learning. In addition, the center provides funding for course enhancements through its annual CELT Course Enhancement mini-grant program. Specific services offered are as follows:

- Teaching enhancement services
 - » Review of course materials, syllabi, and assessments
 - » Classroom visitation/observation services
 - » Promotion of peer observations
 - » Review of student evaluations
- Workshop and seminar series focused on best teaching practices
- Orientation and support services for new University faculty
- Teacher training for graduate student instructors

To learn more about CELT or request services, please visit the CELT page on the University Intranet.

CAREER DEVELOPMENT

The Khalifa University of Science and Technology assists students in career planning and obtaining appropriate employment through provision of career services activities that follow best practices. The University is responsible for delivery of professional services that meet the needs of its stakeholders including current students, alumni and employers. Career Services are available to students beginning with their first enrollment.

Career Services engage students in educationally purposeful experiences resulting in student learning and development, academic success and degree completion. Our aim is to help students identify academic majors, develop career plans and goals, become employment ready and build relationships with employers.

To prepare students for internships and employability the following career related workshops are offered, but not limited to:

- Workshops on resume writing and cover letter development
- Workshops on interview skills and etiquette
- Career Fairs providing effective opportunities to network with hiring employers
- Internship preparation workshops: orienting students on the internship process

EXTERNAL SCHOLARSHIPS

The Khalifa University of Science and Technology, along with its partners, offers a number of selective undergraduate scholarships for its students. The goal behind allowing such scholarships is to link students to industry, support Emiratization, provide guaranteed internship opportunities, and build links with the University's research and development activities. Students are encouraged to search for their desired scholarships, taking into account that University Scholarship Office must be informed prior to signing any scholarship.

STUDENT SUCCESS OFFICE

Student Success Office offers a University Success Program that includes the following topics: developing effective study habits; discovering personal learning styles; understanding the importance of managing time; exploring personal values and interests. The Student Success Office provides academic support for students in different ways, such as academic advising, peer tutoring and leadership workshops. The Peer Tutoring Program seeks to offer academic support as requested by students in all degree disciplines and course levels. Tutoring is provided on a one-to-one basis, however tutoring to small groups can be arranged. Peer tutoring is viewed as a means to supplement classroom instruction, foster independent learning, build self-esteem and assist students in improving their academic skills. The program will continue to evolve to provide quality tutoring for the University student body.

COMMUNITY SERVICES

Student Success Office offers Community Service required for all undergraduate students. Students have to carry out a minimum of 20 hours of Community Service per academic year, for a

total of 80 hours (or 100 hours if a preparatory year is included) of Community Service/ Service Learning to graduate. Students will not be able to graduate from the Khalifa University of Science and Technology unless they complete the required community service hours. Students who fail to achieve the required hours of community service program during the study program, will take the full responsibility for their graduation suspension. The main purpose of the Community Service Program is to contribute to the region through student's involvement

COUNSELING SERVICES

The Student Success Office also provides an essential service to students through the available counseling services. Counseling services at the Khalifa University of Science and Technology are designed to help students cope with their everyday challenges to ensure they reach their full potential and succeed. It is important that students deal with their challenges before they become overwhelmed. The University counseling team help students develop the skills necessary to overcome any challenges they may face while studying at the University. They are devoted to aiding in the academic, emotional, social, and intellectual development of our students. The goal is to empower students and support them in creating a lifelong change that will stay with them to fulfill their dreams and reach their full potential. Counselors are available to support students with social issues, life adjustments and offer encouragement. The support is offered through one-on-one sessions, group counseling, campaigns, and workshops covering various topics catered to the needs of the students. Counseling services also assist students with special needs by offering special accommodation to ensure they are not disadvantaged because of their disability. The guiding principle of counseling is built on trust; hence all counseling sessions are held to high level of confidentiality.

In addition to the above, the Student Success Office is responsible for approving students' excused absences and official business absences per the established policy and procedures.

STUDENT ACTIVITIES AND EVENTS CAMPUS LIFE

Purposeful and planned student activities at the Khalifa University of Science and Technology provide a friendly atmosphere for a multicultural and co-educational student body. The aim is to create a vibrant environment around co-curricular activities that extend beyond the classroom.

Khalifa University of Science and Technology students are encouraged to organize and lead many events and activities. These activities and programs include: a talent day, UAE National day celebrations, Film Festival, Student Leadership Day and intramural competitions. The on-campus facilities to support these co-curricular activities include student lounges and activity rooms (male and female), kitchens, cafés and wireless internet access areas. The university encourages the establishment of a variety of student organizations and clubs reflecting various student interests.

Some of the student current clubs at the Khalifa University of Science and Technology

 Hope	 Happiness
 Arabic	 Han
 Spanis	 Art
 Debate	 Nippon
 Programming	 Literature
 Anime	 Green crescent
 Music	 Gastronomy
 Media	 Emirati
 Games Dev	 Pioneers
 Sport	 Theater and talent
 Photograph	 Sustainability
 Story writing	

PROFESSIONAL ORGANIZATIONS

The current available professional organizations are listed below.

AIAA Student Chapter

The objectives of the University's American Institute of Aeronautics and Astronautics (AIAA) student chapter is to promote the profession of aerospace engineering through organized activities in the areas of academic study and research, and to offer quality engineering experiences that cannot be obtained in the classroom environment. The goal of the University's AIAA chapter is:

- To promote aerospace engineering to students.
- To establish links between students and aerospace companies through a series of industrial trips.
- To encourage students to participate in AIAA competitions, such as the design build and fly competition.

Chapter membership is open to both undergraduate and graduate students from the Khalifa University of Science and Technology. Any student who is enrolled as a student in aerospace engineering or in any graduate-level degree program is eligible for membership of the chapter.

ASCE Student Chapter

The mission of the University's American Society of Civil Engineers (ASCE) student chapter is to provide an enriching experience to its members and to build academic, social and professional relationships in addition to developing leadership, advocating lifelong learning and promoting professionalism. The student chapter conducts regular meetings with speakers from a variety of civil engineering fields on professional issues and technical topics. It organizes field trips in different related domains: Geotechnical, Structural, Construction and Environmental. It participates in community service projects, ensures entries in national and international competitions, helps students participate in the ASCE Student Conferences, and sends potential members to workshops for Student Chapter Leaders. ASCE student chapter offers students an excellent opportunity to learn more about the civil engineering profession and to meet with civil Engineering professionals and learn from them.

ASME Student Chapter

The University's student chapter of the American Society of Mechanical Engineering (ASME) serves to help students to be professional and open-minded

to new ideas. It aims to develop partnerships with industries, government agencies and other academic institutions. In addition, one of the ASME goals is to achieve international visibility by organizing and participating in technical conferences, seminars, lectures and competitions. The group participates in events like the Student Professional Development Conference (SPDC) held in Lebanon, and the Robocop and Human Powered Vehicle Competitions. It seeks to offer its members online courses and workshops that develop engineering and communication skills as well as social events to encourage other students to join.

IEEE Student Chapter

The Institute of Electrical and Electronics Engineers (IEEE) is the world's largest professional association for the advancing of technology. The University's IEEE student chapter aims to prepare students of the Khalifa University of Science and Technology to face challenges in the outside world and equip them with all the sufficient knowledge of their own field as well as being distinguished by their awareness of other fields' progress and their ability to communicate with others. IEEE and its members encourage a global community through IEEE's highly cited publications, conferences, technology standards, and professional and educational activities. The IEEE student chapter vision is a continuous, successful and productive student branch that holds new and innovative activities in both the scientific and social environments. Its mission is to be the definite article that merges all disciplines and activities into one big integrated multidisciplinary team of innovation and productivity. Registration in the chapter is open for all majors of engineering.

IIE Student Chapter

The objectives of the University's Institute of Industrial Engineers (IIE) student chapter is to promote the profession of industrial engineering through organized effort in study, research and discussion of the fields of industrial engineering and the dissemination of knowledge thereby gained. Any University student who is enrolled as a fulltime student at the undergraduate or graduate level in industrial and systems engineering or another field that will enhance professional competence is eligible for membership in the chapter.

The goals of the IIE student chapter are to:

- Invite several professionals from Industry to campus to share their experiences and motivate the student body.

- Organize workshops, field-trips and other academic activities to help the development of student body.
- Organize and participate in events to help promote the discipline.
- Organize regional meetings and a conference with other IIE chapters in the UAE and Middle East and North Africa, to network with future colleagues from other universities.

STUDENT GOVERNANCE

The Khalifa University of Science and Technology promotes the active participation of students in the governance of the university. Every student on campus, undergraduate or graduate, is eligible to serve on a student council, university committee or departmental advisory board, as applicable.

STUDENT COUNCIL

The purpose of the University Student Council is to provide the student body with a common platform that promotes interaction among students and the University body. The Student Council works closely with the Division of Student Services to foster a spirit of community, understanding, and harmony throughout the campus. The Student Council also aims to provide students with unique opportunities to develop life skills and leadership qualities by organizing activities and hosting events of interest to the students.

- To provide a link between the student body and University Management.
- To encourage participation in extracurricular activities.
- To coordinate university events involving the campus community, such as UAE National Day, Leadership Day, International Day etc.
- To create a collaborative, caring, and participative work environment.
- To enhance the educational, physical, social and emotional well-being of the students.
- To provide students with a platform to voice their views and facilitate action from the campus administration on any issues, needs and concerns.
- To organize clubs, field trips, workshops and competitions.
- To provide opportunities for students to develop life skills.
- To develop leadership skills.

STUDENT CONDUCT REGULATIONS STUDENT RIGHTS

Every Khalifa University of Science and Technology (KU) student enjoys all rights and freedoms afforded by the laws of the United Arab Emirates.

Every student has a right to equal treatment by the university. A student has a right to be free from discrimination based on race, color, origin, religion, gender or special needs.

In general, a student has the right to:

- Attend classes and work in laboratories in accordance with the related academic policies and procedures;
- Participate in athletic and recreational activities as per the associated guidelines;
- Partake in student governance within the subscribed policies and procedures;
- Receive fair treatment and due process in case of an investigation or appeal;

Every student has a right to safeguard of his or her dignity. This right includes protection by KU against vindictive conduct displayed by a representative of the university acting in an official capacity.

KU respects a student's right to privacy of personal information in regard to student records, counseling records, and personal information (see ACA 3850 Confidentiality and Privacy of Student Records).

Every student has a right to be free from reprisal or threat of reprisal made by a person in a position to offer or deny to the student an academic advantage or opportunity relating to the status of a student. A student has the right to appeal an academic or financial decision or ruling, or a sanction resulting from a code of conduct violation.

A student has a right to file a grievance regarding a perceived injustice without fear of negative repercussions.

KU has an obligation to ensure that administrative decisions are made, or actions taken, with fair regard for the known and legitimate interests of students. KU has an obligation to maintain safe and suitable conditions of learning and study.

KU has an obligation to ensure that adequate measures are taken to protect the security of students on university property.

KU will not apply retroactive changes to university regulations to the detriment of any student.

SPECIAL NEEDS ACCOMMODATIONS

- Entry into a specific academic program is dependent upon the student's ability, with reasonable accommodations, to achieve the learning outcomes of that program.
- Khalifa University of Science and Technology (KU) provides assistance and reasonable accommodations to students with special needs. The services provided include information on accessibility, identification of possible accommodations, and liaison with faculty and staff in establishing reasonable accommodations (e.g., equipment, testing modification, note-taking, etc.).
- Khalifa University ensures confidentiality of information related to the special needs cases.
- A student suspected of having a special need should be brought to the attention of the Office of Student Success (OSS) who will assess, plan and coordinate the follow up for referral or recommendations.

NON-ACADEMIC STUDENT CONDUCT

The Division of Student Services is responsible for reviewing all alleged violations of non-academic student conduct. Non-academic offenses are related to behaviors that disrupt the life of the University community. Nonacademic offenses include, but are not limited to, the following categories.

- Disruption of teaching or other University activities including administrative processes.
- Unauthorized entry and/or presence on University property.
- Threat, damage, and destruction of University property or the property of other members of the University community.
- Physical abuse, harassment, and dangerous activities.
- Possession of stolen property.
- Unauthorized or fraudulent use of University facilities, equipment or services.
- Misuse of library and information technology resources.
- Any behavior or appearance deemed by UAE or the University norms to be offensive to the culture.

Behaviors deemed to be unacceptable may lead to a variety of sanctions up to and including student dismissal from the University. The University Student Handbook and website details University policies and procedures regarding student conduct regulations, hearings and sanctions.

DRESS CODE

All employees and students are required to adhere to the University dress code when on campus or representing the University off-campus.

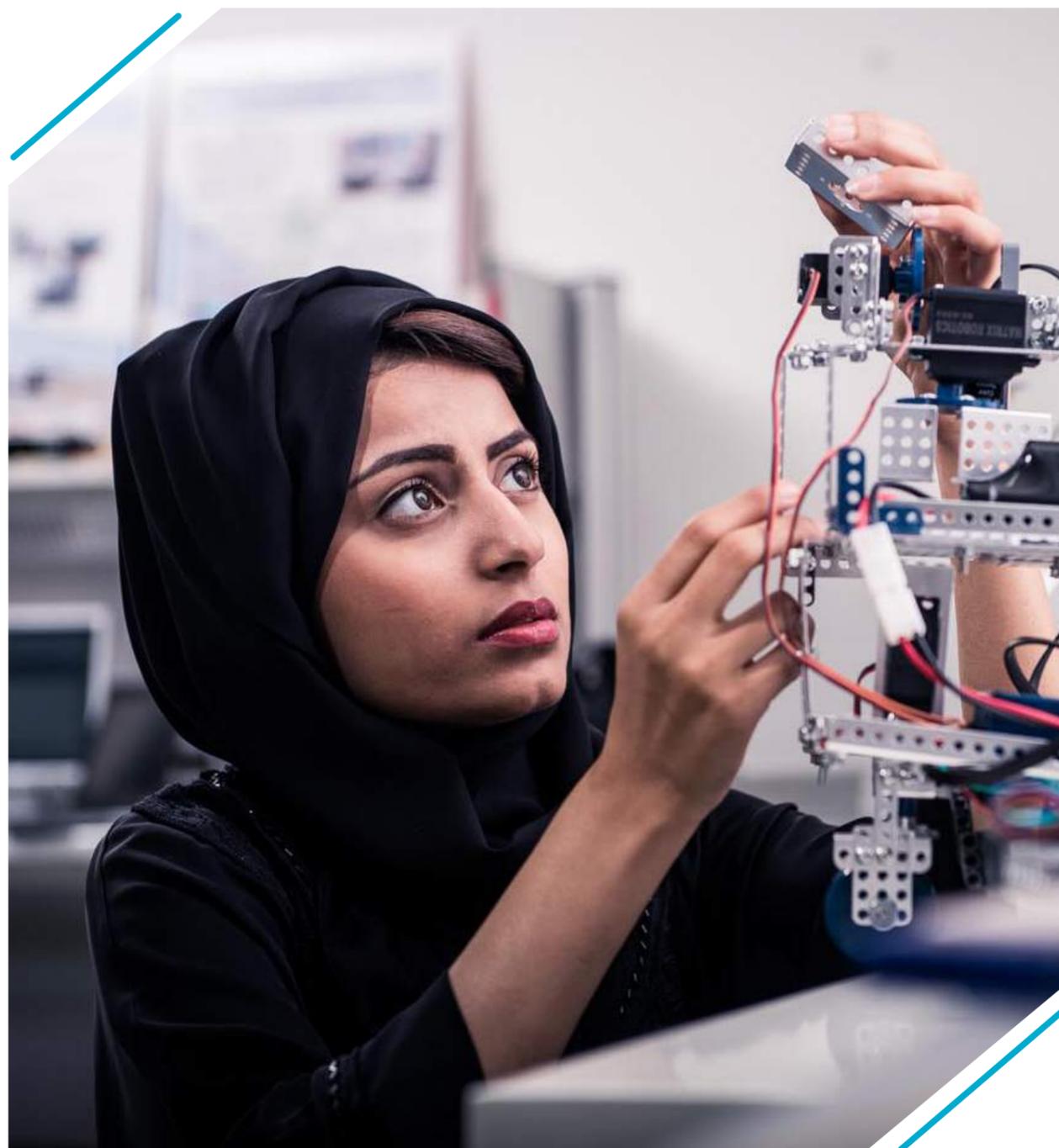
STUDENT CODE OF CONDUCT

Every member of the Khalifa University of Science and Technology (KU) community is required to follow the principles of decency, modesty and propriety in their behavioral conduct and dress code in line with the spirit of the national cultural norms and religious traditions of the United Arab Emirates at all times, both on and off campus. To this end, all students must comply with the conventions and regulations of university life established to maintain order, protect individuals and property, and fulfill the university's mission and purpose.

STUDENT GRIEVANCES AND APPEALS

The Khalifa University of Science and Technology aims to provide a fair, equitable and productive learning environment for all its students that include a variety of means by which student grievances are brought to consideration and subsequent resolution in a timely manner.

A student has the right to appeal or file a grievance against academic or financial decisions or rulings, or a sanction resulting from a code of conduct violation. Students must follow the established procedures and adhere to time limits for filing a grievance or appeal. The University will issue an official written response.



COLLEGE OF ARTS AND SCIENCES

The College of Arts and Sciences is responsible for conducting leading-edge research, and delivering effective student-focused teaching, in fundamental science and humanities disciplines at the Khalifa University of Science and Technology. Our activities include teaching to meet the accreditation requirements of the academic programs offered by the College of Engineering, as well as delivering existing and future BSc, MSc and PhD programs to meet the needs of the Emirate of Abu Dhabi, the UAE and the GCC region for workforce skills in the STEM disciplines.

COLLEGE MISSION

Our mission is to deliver research-led teaching in fundamental science and humanities disciplines to educate tomorrow's generation of scientists and engineers as human capital for a knowledge economy. We encourage fundamental research in all disciplines, which will inform our curriculum and maintain currency and relevance.

COLLEGE VISION

Our vision is to lead research excellence in Science and Humanities thus underpinning Khalifa University of Science and Technology's research strategy, a strategy which also maps on to the UAE's key research priorities. We will nurture and develop human capital at all levels, train tomorrow's scientists and engineers to the highest international standards and establish our University as a research-intensive centre of educational excellence for the region and the world.

PREPARATORY PROGRAM

The objective of the Preparatory Program at the Khalifa University of Science and Technology is to provide a bridge for students to successfully make the transition from high school to undergraduate studies. To achieve this, the program introduces them to the rigor and discipline of academic study in a caring and supportive environment where personal development, independent study, and critical thinking are nurtured.

The aims of the Preparatory Program are to ensure that students have a sound foundation in Chemistry, Mathematics, and Physics, and that their English language proficiency is sufficient to allow them to pursue undergraduate and graduate studies in an English-medium university. In

addition, students are taught the academic study skills necessary for success in tertiary education and are exposed to the behavioral competencies required to become not only successful students but also effective members of society.

The program is designed so that students complete the requirements in one year without repeating any course more than once. Depending on the level of entry, students typically spend one or two semesters in the program. All students who gain entry to the Preparatory Program are given every opportunity to succeed and meet the criteria for full admission to undergraduate studies at Khalifa University. Regular assessments are conducted to identify student progress and to offer remedial support where necessary. Assessments take the form of traditional-style examinations, assignments and quizzes, as well as projects and presentations.

To further support students in the Preparatory Program, class sizes are kept small wherever possible, students are encouraged to become actively involved in the learning process, and both instructors and advisors are readily available to assist students outside of class hours.

Acceptance to the undergraduate program is based on successful completion of the Preparatory Program. This is evidenced by a student's overall academic record, successful completion of all Preparatory Program courses with a grade of C or higher, and achievement of a Band 6 in the external IELTS (or equivalent).

CURRICULUM

Students are enrolled in appropriate English, Mathematics, Chemistry, and Physics courses based on their results on the Khalifa University of Science and Technology Placement Test.

ENGLISH LANGUAGE COURSES

ENGL 001	Preparatory English I	14 cr.
ENGL 002	Preparatory English II	14 cr.
ENGL 003	IELTS Exam Skills	14 cr.

STEM Courses

STEM 001	STEM I	12 cr.
STEM 002	STEM II	12 cr.

Course Descriptions**ENGL001 Preparatory English I (14-0-14)**

Prerequisite: IELTS 5, IBT TOEFL 61-69, or EmSAT 1100 - 1249

In this course, students will develop the English language skills needed to meet the requirements of ENGL002. During the course, students will read general and academic texts and will listen to a variety of short conversations and lectures to help improve comprehension skills. Students will be expected to take notes and annotate academic texts, write short texts which require critical thinking based on course readings and lectures, present information orally, and develop test taking skills.

ENGL002 Preparatory English II (14-0-14)

Prerequisite: Initial placement with IELTS 5.5, IBT TOEFL 70-78 or EmSAT 1250 or successful completion of ENGL001 with a grade of C or above.

In this course, students will develop the required English language proficiency for freshman year entry. During the course, students will read a variety of texts to help improve their reading skills. They will also listen to different types of conversations and lectures to develop listening and note-taking skills. In addition to the various types of input to which students will be exposed, they will be required to produce written texts of various genres and complete oral presentations. This course will also provide students with specific training on how to adequately meet the task demands required in the IELTS exam.

ENGL003 Preparatory English III (14-0-14)

Prerequisite: Successful completion of ENGL002 and <IELTS 6.0 or <TOEFL iBT 79

ENGL003 provides students with the language

skills, enhanced knowledge of common topics, and test-taking strategies required to achieve the necessary requirements for transfer into freshman year courses. The course is designed for students who have passed the ENGL002 course, but have yet to reach the required proficiency exam score. This course runs for six weeks.

STEM COURSES

This course is an introduction to university mathematics and sciences. This is a developmental pre-freshman level course involving mathematics, chemistry, and physics with an emphasis on their integration and application to engineering. The course is offered to prepare students for their level one, freshman year, courses. The course delivers content using recent technology and hands-on techniques with an emphasis on self-study, context-rich problem solving, and study skills for university students.

STEM001 STEM I

Prerequisite: Students are placed into STEM001 if they satisfy minimum university admission criteria, have a minimum IELTS score of 5.0 (or equivalent) and have achieved a minimum score on a Mathematics Entrance Exam.

Mathematics Component (5-0-5)

This course is a developmental college algebra level course involving basic algebraic operations, solving equations and inequalities, introduction to complex numbers, problem solving, lines, graphing linear equations and models, functions, exponents and polynomials, factoring and quadratic equations, rational expressions and related equations, and solving systems of linear equations. The course delivers content using a hands-on hybrid flipped model with an emphasis on self-study, context-rich problem solving, and study skills for university students.

Physics Component (2-2-4)

This course is an introduction to university physics. This is a developmental pre-calculus level course involving algebra, geometry, trigonometry, and

physics (mechanics) with an emphasis on their integration and application to engineering. The course is offered to prepare students for their level one, freshman year, courses. The course delivers content using recent technology and hands-on techniques with an emphasis on self-study, context-rich problem solving, and study skills for university students.

Chemistry Component (1-2-3)

This course provides students with an introductory chemical foundation in preparation for their freshman year studies. The course surveys the basic properties of matter and laws of matter, and focuses on developing numerical problem solving skills using the basic tools of quantitative chemistry. The tutorial/laboratory activity offers an early hands-on training experience on visualizing, analyzing and understanding the basic properties of matter.

STEM002 STEM II

Prerequisite: Students are placed into STEM002 if they satisfy minimum university admission criteria, have a minimum IELTS score of 5.0 (or equivalent) and have achieved a minimum score on a Mathematics Entrance Exam and/or have passed the STEM 1 course with a grade of C or above.

Mathematics Component (4-0-4)

This course is a developmental pre-calculus level course involving polynomials, rational functions, exponential and logarithmic functions, trigonometric functions and trigonometric identities and their application. The course delivers content using a hands-on hybrid flipped model with an emphasis on independent and self-study, context-rich problem solving, and study skills for university students.

Physics Component (2-2-4)

This course is an introduction to university physics. This is a developmental pre-calculus level course involving algebra, geometry, trigonometry, and physics (electromagnetism) with an emphasis on their integration and application to engineering. The

course is offered to prepare students for their level one, freshman year, courses. The course delivers content using recent technology and hands-on techniques with an emphasis on self-study, context-rich problem solving, and study skills for university students.

Chemistry Component (2-2-4)

This course provides students with the entry requirements in chemistry in preparation for their freshman year studies. Topics include chemical measurements, properties of matter, chemical reactions, stoichiometry, acidic and basic solutions, in addition to chemistry-related environmental issues. This course focuses on developing numerical problem solving skills using the basic tools of quantitative chemistry. The laboratory component develops the students' practical skills in handling basic chemical measurements and reactions.

DEPARTMENT OF CHEMISTRY**Introduction**

The Department of Chemistry at Khalifa University is dedicated to meeting the strategic needs of Abu Dhabi, the UAE and the international community by supporting excellence in chemical education and research. This is achieved through scientific innovation and technological advancements in diverse fields that can be better approached with an in-depth understanding of matter and its transformations at both the macroscopic and molecular levels.

Our department currently embraces a multifaceted international community of full-time scholars who are actively engaged in both fundamental and applied research, covering vital areas such as environment, energy, and human health. The Department further strives towards its goals by actively developing modern experimental and computational research as well as its teaching methods, in addition to providing appropriate mechanisms for technical exchange, collaboration, and employment of students.

At present, the department offers a BSc in Chemistry. The program meets the demand for qualified chemists across a range of sectors and will support the transfer of crucial science and engineering knowledge through the expertise of faculty members, advisory group members, consultants, as well as industrial partners. The program is expected to help in enhancing the chemistry research and development in the UAE and the region as a whole.

BACHELOR OF SCIENCE IN CHEMISTRY

The BSc in Chemistry program educates future scientists to design, develop, and investigate chemical processes at the fundamental scale. A chemistry education provides a holistic set of skills (e.g. computational, analytical, numerical and synthetic) and methodologies for observing the physical world. Chemistry students further have an opportunity to pursue their interests in more specialized sub-disciplines of chemistry through available degree-tracks, designed to serve the country's needs in three vital areas: environmental, materials and forensic sciences.

- I. The Environmental Chemistry track is expected to promote sustainable development through environmental monitoring and assessment, green chemistry and recognition of the renewable sources of energy.
- II. The Materials Chemistry track, which revolves around nanoscience and nanotechnology, will contribute to the advancement of chemical manufacturing technologies in the petrochemical industries.
- III. The Forensic Chemistry track will promote the analytical problem solving skills required in disciplines as diverse as criminology and healthcare.

Chemists synthesize life-saving drugs within the pharmaceuticals, biotechnology and life sciences sectors and although these are nascent industries within the UAE, the BSc in Chemistry program intends to pave the way for training a new generation of graduates who can play a leading role in developing these crucial sectors of the UAE economy.

Upon successful completion of the degree, Chemistry graduates can pursue further studies or careers in business, industry and academia, locally or internationally. Typical employment fields within the UAE and the Gulf region encompass quality control, technical roles, education, consultancy, research and development. Such employment exists within industrial and chemical laboratories, university and industrial research centers, environmental protection agencies, chemical manufacturing plants and forensic chemistry laboratories (e.g. criminology and clinical science).

Program Educational Objectives

The BSc in Chemistry program aims to produce graduates who will:

- Possess substantial technical skills and theoretical knowledge of chemistry, and will be able to apply these appropriately in a variety of professional or academic contexts.
- Be competent in a broad range of technical and non-technical transferable skills, which are needed to have successful careers and assume leadership roles in industry, business and the government sector.
- Be prepared to pursue advanced studies in a range of disciplines, including but not limited to those allied to chemistry.

Student Learning Outcomes

Students graduating with a BSc in Chemistry will have achieved the following set of knowledge and performance based skills, and affective competencies:

- a. Students will have specialized knowledge of the major sub-disciplines within chemistry, and will have the capacity to apply that knowledge in a professional context.
- b. Students will have a broad understanding of the sciences, mathematics and other disciplines relevant to chemistry and will be able to integrate that knowledge to solve problems.
- c. Students will be able to efficiently search for, retrieve and critically evaluate technical literature and data.
- d. Students will be able to design and implement laboratory or computational experiments, analyse the resulting data, and apply appropriate safety measures.

- e. Students will be able to use the scientific method, apply critical thinking and reason analytically to solve chemical problems and conduct research.
- f. Students will be able to communicate effectively in oral or written form, to a range of scientific and non-scientific audiences. Students will be able to work productively in multidisciplinary teams to solve problems, debate different points of view, and exercise self-reflection following professional norms.
- g. Students will demonstrate an understanding of the societal and economic importance of

chemistry, and the significance of ethical and environmental concerns for acting responsibly among chemists.

Program Structure and Requirements

The normal length of the program is 127 credits. To be recommended for graduation with a BSc in Chemistry, students must satisfactorily complete the courses in the specified categories as set out below. The categories cover an extended set of the University General Education Requirements (GER), as well as the Chemistry Core and Technical Elective Requirements.

Chemistry Mathematics/Science Requirements (5 credits)

The BSc in Chemistry program requires the following Mathematics/Science courses, in addition to the GER:

CHEM 105	Health and Safety in Science	1 cr.
CHEM 200	Quantitative Methods in Physical Sciences	4 cr.

Chemistry Core Requirements (58 credits)

CHEM 106	Chemical Information Research Skills	3 cr.
CHEM 116	General Chemistry II	4 cr.
CHEM 221	Organic Chemistry I	4 cr.
CHEM 222	Organic Chemistry II	4 cr.
CHEM 231	Physical Chemistry I	4 cr.
CHEM 332	Physical Chemistry II	4 cr.
CHEM 330	Introduction to Computational Chemistry	4 cr.
CHEM 311	Biochemistry I	4 cr.
CHEM 241	Introduction to Analytical Chemistry	4 cr.
CHEM 342	Spectroscopic and Separation Methods in Analytical Chemistry	4 cr.
CHEM 343	Advanced Instrumental Analysis Techniques in Chemistry	4 cr.
CHEM 351	Main Group Compounds: Structure, Reactivity and Characterization	4 cr.
CHEM 352	Advanced Inorganic Chemistry	4 cr.
CHEM 399	Internship	1 cr.
CHEM 497	Senior Research Project I	3 cr.
CHEM 498	Senior Research Project II	3 cr.

Additional Program Structure and Requirements

Chemistry Technical Elective Requirements (12 credits)

To satisfy a total of 12 credits of technical electives, every student must select one of the degree tracks offered by the Department depending on student's general interests for the sub-discipline, on higher study plans, on scholarship type, or pre-defined employment areas and opportunities.

At present, three areas of specializations are offered:

(i) Environmental Chemistry, (ii) Forensic Chemistry, and (iii) Materials Chemistry.

BSc in Chemistry students need to select 12 credits from the following list:

CHEM 461	Environmental Chemistry	4 cr.
CHEM 462	Pollution Science and Control – Management, Technology and Regulations	4 cr.
CHEM 463	Methods for Environmental Trace Analysis	4 cr.
CHEM 471	Fundamentals of Forensic Science	4 cr.
CHEM 472	Forensic Chemistry and Evidence Analysis	4 cr.
BMED 413	Applications of Bio-Molecular Tools	4cr.
CHEM 481	Nanoscience and Nanotechnology	4 cr.
CHEM 482	Nanochemistry	4 cr.
CHEM 483	Polymer Chemistry	4 cr.
CHEM 391*	Independent Study I	1-3 cr.
CHEM 491*	Independent Study II	1-3 cr.
CHEM 495*	Special Topics in Chemistry	3 cr.

*At most four credits of the technical electives may be satisfied from a different track after departmental approval. In special cases, a student will be allowed to satisfy at most four credits of technical electives via alternative advanced chemistry free elective topics, subject to departmental approval. At most three credits of the technical electives may be at 300-level and at most three credits may be independent study.

Free Elective Requirements (6 credits)

Free electives are intended to provide students with some flexibility to develop depth and/or breadth of theoretical and/or experiential knowledge to support their career paths and individual interests.

Typical Course Sequence for a BSc degree in Chemistry

	FALL SEMESTER	SPRING SEMESTER
YEAR 1	ENGL 111 English Communication I	ENGL 112 English Communication II
	MATH 111 Calculus I	PHYS 121 University Physics I
	CHEM 105 Health and Safety in Science	MATH 112 Calculus II
	CHEM 106 Chemical Information Research Skills	CHEM 116 General Chemistry II
	CHEM 115 General Chemistry I	
S		
YEAR 2	HUMA XXX Humanities and Social Sciences	Free Elective
	CHEM 200 Quantitative Methods in Physical Sciences	CHEM 231 Physical Chemistry I
	CHEM 221 Organic Chemistry I	CHEM 222 Organic Chemistry II
	PHYS 122 University Physics II	CHEM 241 Introduction to Analytical Chemistry
S	HUMA XXX Humanities and Social Sciences	
YEAR 3	CHEM 330 Introduction to Computational Chemistry	HUMA XXX Humanities and Social Sciences
	CHEM 332 Physical Chemistry II	CHEM 311 Biochemistry I
	CHEM 342 Spectroscopic and Separation Methods in Analytical Chemistry	CHEM 343 Advanced Instrumental Analysis Techniques in Chemistry
	CHEM 351 Main Group Compounds: Structure, Reactivity and Characterization	CHEM 352 Advanced Inorganic Chemistry
	CHEM 399 Internship	
YEAR 4	BUSS 201 Fundamentals of Accounting and Finance	BUSS 301 Inside Organizations
	HUMA XXX Humanities and Social Sciences	CHEM 498 Senior Research Project II
	CHEM 497 Senior Research Project I	Technical Elective
	Technical Elective	Technical Elective
	Free Elective	

S SUMMER

DEPARTMENT OF EARTH SCIENCES Introduction

The Earth Sciences Department at Khalifa University is an internationally recognized center of excellence in education and research in petroleum geology and geophysics, and will be the leading university center of geosciences education, continuing education, and research in the Middle East, with a strong research effort focused on local and regional geology.

The Earth Sciences Department provides high-quality education in geology and geophysics to prepare students for a wide range of successful and socially and ethically responsible professional careers. Graduates can join both the local and international petroleum industry or may find career opportunities in governmental and non-governmental companies.

The Department offers students a modern educational program leading to a BSc degree in Petroleum Geosciences.

BACHELOR OF SCIENCE IN PETROLEUM GEOSCIENCES

The BSc in Petroleum Geosciences aims to provide a high-quality education in petroleum geology and geophysics and to produce graduates for successful, and socially and ethically responsible, careers in the petroleum industry and other geosciences sectors that meet or exceed the needs and expectations in attaining technical and personal competencies.

The program offers a blend of geology and geophysics as they relate to the discovery and exploitation of oil and gas.

The degree program also offers an optional concentration in Petroleum Geophysics for students who wish to focus on this specific area of the geosciences. The strengths of the Petroleum Geosciences curricula include an emphasis on geosciences project work and use of modern software applications. In addition, emphasis is placed on the development of professional skills during coursework. Petroleum Geosciences laboratories, including a computer laboratory, are well equipped, and up-to-date geophysical equipment is available for field exercises. The program features a summer field geology course for students following the Petroleum Geosciences curriculum, and a

summer internship in industry for students of the concentration in Petroleum Geophysics.

Program Educational Objectives

The BSc in Petroleum Geosciences aims to produce graduates who will be able to:

- Apply geological and geophysics knowledge and skills to recognize exploration, development, and production problems and design technically, economically, and environmentally sound solutions to find and maximize the value of petroleum resources of the UAE.
- Contribute effectively, including in leadership roles, in multi-disciplinary exploration, development, and production teams.
- Function ethically and with integrity such that society and industry benefit from their work as petroleum geoscientists.
- Continue personal and professional growth through self-education.
- Meet, or exceed, expectations of employers of the petroleum industry and other geosciences sectors in attaining technical and personal competencies.

Student Learning Outcomes

Upon completion of the BSc in Petroleum Geosciences, graduates will be able to:

- a. Apply knowledge of mathematics, chemistry, physics, geology, and geophysics to solve petroleum geosciences problems.
- b. Apply knowledge to formulate solutions to geoscience problems involving design of geophysical surveys, acquisition and processing of geophysical data, and make geological interpretations from results.
- c. Apply three-dimensional Earth models to solve exploration and production-type issues from appropriate geological, petrophysical and geophysical data.
- d. Function effectively on multi-disciplinary teams.
- e. Demonstrate an awareness of the social, ethical, and professional responsibilities in the exploration and exploitation of energy and natural resources, and a concern for major regional and global social and environmental issues.
- f. Demonstrate an ability to communicate in oral and written forms in English appropriate to the petroleum and broad energy industry.

- g. Demonstrate the recognition of the need for, and an ability to engage in, continual lifelong education.

An additional outcome for the Petroleum Geophysics concentration will be the ability to:

- h. Analyze, quantitatively, the errors, limitations, and uncertainties in data.

Program Facilities

The Earth Sciences Department laboratories are located in the Arzanah, Bu Hasa, and Ruwais buildings on the Sas Al Nakhl Campus. The laboratories in the Arzanah Building include geology and geophysics teaching laboratories, dedicated core-layout areas, laboratories for sample and equipment preparation, and a dedicated geosciences computer laboratory equipped with a wide range of industry-standard geoscience software. In the Ruwais and Bu Hasa buildings, the laboratories focus on undergraduate teaching and research support. These laboratories include a scanning electron microscopy laboratory, a geoscience computing laboratory, petrographic microscopy laboratory and geophysical equipment storage and testing laboratory.

Professional Chapters and Clubs

The American Association of Petroleum Geologists (AAPG) student chapter in the Petroleum Geosciences Program is the first AAPG Chapter established in the UAE. The AAPG student chapter provides a variety of programs and opportunities for students to have contact with the professional geosciences community, to have access to unique learning and leadership opportunities, to receive member benefits and to be eligible for grants.

The Petroleum Geosciences Student Society aims to help and support students as they prepare to start their careers within the Petroleum Geosciences. As well as supporting the next generation of geoscientists, the society also provides a range of social activities for geosciences students at the University. Recent activities included guest seminars and lectures, field trips, social evenings and sporting events.

The student chapter's affiliation with the Society of Exploration Geophysicists (SEG) and the European Association of Geoscientists and Engineers (EAGE)

provides a means of contact with the geosciences profession both inside and outside of academia. Active participation in the student chapters provides students with an opportunity to develop leadership and management skills. A sense of professionalism is developed by actively running an organization and networking with professionals.

Degree Requirements

The BSc in Petroleum Geosciences requires a total of 137 credit hours. These consist of 23 credit hours of General Education Requirements (GER), 12 credit hours of General Engineering Requirements, 30 credit hours of Mathematics and Basic Sciences, three credit hours of a Free Elective, and 69 credit hours of specific Major Requirements, including a four-credit hour, four-week Field Petroleum Geology Course, and six credit hours of a Senior Research Project.

Additionally, the Petroleum Geophysics concentration requires a total of 137 credit hours. This consists of 23 credit hours of General Education Requirements (GER), 12 credit hours of College of Engineering Requirements (CER), 30 credit hours of Mathematics and Basic Sciences, three credit hours of a Free Elective, and 69 credit hours of specific Major Requirements, including a one credit hour, three-week internship, and six credit hours for a Senior Research Project. The concentration includes 16 credit hours in the specialized field.

BSc in Petroleum Geosciences Free Electives (3 credits)

All students must complete at least 3 credits of free electives which are intended to provide students with flexibility to support their career paths and individual interests. They will support the development of technical expertise within the student's disciplines, as well as, undergraduate research and independent study opportunities. They can also be used for an additional Humanities and Social Sciences course or any other course offered by the Department chosen among the non-required courses of the curriculum.

The following is a sample list of courses that will satisfy the Free Elective requirement for the BSc in Petroleum Geosciences and the BSc in Petroleum Geosciences Concentration in Petroleum Geophysics.

COURSE CODE	TITLE	CREDITS
PGEG 324	Remote Sensing for Earth Science Applications & GIS	3 cr.
PGEG 413	Micropaleontology	3 cr.
PGEG 293, 393, 493	Special Topics in Petroleum Geosciences	1 cr. - 4 cr.
PGEG 394, 494	Research Topics in Petroleum Geosciences	1 cr. - 4 cr.
PGEG 396, 496	Independent Study in Petroleum Geosciences	1 cr. - 6 cr.

Typical Course Sequence for a BSc in Petroleum Geosciences

	FALL SEMESTER	SPRING SEMESTER
YEAR 1	ENGL 111 English Communication I 4 cr.	ENGL 112 English Communication II 4 cr.
	MATH 111 Calculus I 4 cr.	PHYS 121 University Physics I 4 cr.
	CHEM 115 General Chemistry I 4 cr.	MATH 112 Calculus II 4 cr.
	ENGR 111 Engineering Design 4 cr.	CHEM 116 General Chemistry II 4 cr.
S		
YEAR 2	HUMA 150 Introduction to Economics 3 cr.	MATH 206 Differential Equations 3 cr.
	PHYS 122 University Physics II 4 cr.	HUMA 102 Islamic Culture 3 cr.
	MATH 231 Calculus III 3 cr.	HUMA XXX Humanities and Social Sciences 3 cr.
	ENGR 113 Introduction to Computing using Matlab 4 cr.	PGEG 210 Earth Materials 3 cr.
	PGEG 221 Introduction to Geology and Geophysics 3 cr.	PGEG 220 Geology of the Middle East 3 cr.
	PGEG 230 Geological Maps 3 cr.	
S		
YEAR 3	ENGR 311 Innovation and Entrepreneurship 4 cr.	HUMA XXX Humanities and Social Sciences or Business Elective 3 cr.
	PGEG 311 Sedimentary Petrology 4 cr.	PGEG 351 Applied Geophysics 4 cr.
	PGEG 321 Structural Geology 3 cr.	PGEG 361 Sedimentology and Stratigraphy 3 cr.
	PGEG 331 Igneous and Metamorphic Petrology 3 cr.	PGEG 371 Data Analysis and Geostatistics 4 cr.
	PGEG 341 Paleontology 3 cr.	PGEG 381 Rock Mechanics and Reservoirs 3 cr.
S		
YEAR 4	PGEG 397 Field Petroleum Geology 4 cr.	
	PGEG 312 Reflection Seismology 4 cr.	PGEG 412 Seismic Reflection Interpretation 4 cr.
	PGEG 401 Petrophysics and Logging 4 cr.	PGEG 451 Environmental Geology 3 cr.
	PGEG 490 Senior Research Project I 3 cr.	PGEG 461 Reservoir Characterization Project 4 cr.
	Free Elective 3 cr.	PGEG 491 Senior Research Project II 3 cr.
	HUMA XXX Humanities and Social Sciences 3 cr.	

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Typical Course Sequence for a BSc in Petroleum Geosciences - Concentration in Geophysics

	FALL SEMESTER	SPRING SEMESTER
YEAR 1	ENGL 111 English Communication I 4 cr.	ENGL 112 English Communication II 4 cr.
	MATH 111 Calculus I 4 cr.	PHYS 121 University Physics I 4 cr.
	CHEM 115 General Chemistry I 4 cr.	MATH 112 Calculus II 4 cr.
	ENGR 111 Engineering Design 4 cr.	CHEM 116 General Chemistry II 4 cr.
S		
YEAR 2	HUMA 150 Introduction to Economics 3 cr.	MATH 206 Differential Equations 3 cr.
	PHYS 122 University Physics II 4 cr.	HUMA 102 Islamic Culture 3 cr.
	MATH 231 Calculus III 3 cr.	HUMA XXX Humanities and Social Sciences 3 cr.
	ENGR 113 Introduction to Computing using Matlab 4 cr.	PGEG 210 Earth Materials 3 cr.
	PGEG 221 Introduction to Geology and Geophysics 3 cr.	PGEG 220 Geology of the Middle East 3 cr.
	PGEG 230 Geological Maps 3 cr.	
S		
YEAR 3	HUMA XXX Humanities and Social Sciences or Business Elective 3 cr.	ENGR 311 Innovation and Entrepreneurship 4 cr.
	PGEG 300 Matlab for Earth Scientists 3 cr.	PGEG 351 Applied Geophysics 3 cr.
	PGEG 311 Sedimentary Petrology 4 cr.	PGEG 361 Sedimentology and Stratigraphy 3 cr.
	PGEG 312 Reflection Seismology 4 cr.	PGEG 371 Data Analysis and Geostatistics 4 cr.
	PGEG 321 Structural Geology 4 cr.	PGEG 381 Rock Mechanics and Reservoirs 3 cr.
S		
YEAR 4	PGEG 398 Geophysics Internship 1 cr.	
	PGEG 400 Seismic Data Acquisition and Processing 3 cr.	PGEG 410 Reservoir Geophysics 3 cr.
	PGEG 401 Petrophysics and Logging 4 cr.	PGEG 412 Seismic Reflection Interpretation 4 cr.
	PGEG 490 Senior Research Project I 3 cr.	PGEG 451 Environmental Geology 3 cr.
	HUMA XXX Humanities and Social Sciences Elective 3 cr.	PGEG 461 Reservoir Characterization Project 4 cr.
Free Elective 3 cr.	PGEG 491 Senior Research Project II 3 cr.	

S SUMMER

DEPARTMENT OF ENGLISH

Introduction

The Department of English is an academic unit within the College of Arts and Sciences. This department does not currently offer any undergraduate degree programs; however, it does provide courses which support all undergraduate degree programs across the University. The courses currently offered are listed below:

English Courses

ENGL 111	English Communication I	4 cr.
ENGL 112	English Communication II	4 cr.
ENGL 220	Technical Writing and Communication	3 cr.

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Introduction

The Department of Humanities and Social Sciences is an academic unit within the College of Arts and Sciences. This department does not currently offer any undergraduate degree programs; however, it does provide courses which support all undergraduate degree programs across the University. The courses currently offered are listed below:

Humanities and Social Sciences Courses

Business Courses

BUSS 150	Introduction to Economics	3 cr.
BUSS 201	Fundamentals of Accounting and Finance	3 cr.
BUSS 202	Introduction to Organizational Management	3 cr.
BUSS 296	Directed Study	1 cr. – 3 cr.
BUSS 301	Corporate Leadership and Human Resource Management	3 cr.
BUSS 322	Innovation and Private Enterprise in Science	3 cr.
BUSS 395	Special Topics in Business Studies	3 cr.

Humanities and Social Sciences Courses

HUMA 101	Arabic Language	3 cr.
HUMA 102	Islamic Culture	3 cr.
HUMA 105	Emirates Society	3 cr.
HUMA 106	Gulf Region Economic and Social Outlook	3 cr.
HUMA 110	Middle East Studies	3 cr.
HUMA 111	Islamic History	3 cr.
HUMA 112	Sciences in Islam	3 cr.
HUMA 130	Introduction to Linguistics	3 cr.
HUMA 140	Introduction to Psychology	3 cr.
HUMA 141	Introduction to Sociology	3 cr.
HUMA 142	Introduction to Science and Technology Studies	3 cr.
HUMA 210	Introduction to Islamic Law	3 cr.
HUMA 211	Islam and Modernity	3 cr.
HUMA 212	History of Modern Science	3 cr.
HUMA 213	Short Stories from around the World	3 cr.
HUMA 214	Environment and Society	3 cr.
HUMA 220	Public Speaking	3 cr.
HUMA 221	Intercultural Communication	3 cr.
HUMA 230	Thinking through Technology	3 cr.
HUMA 295	Special Topics in Humanities and Social Sciences	3 cr.
HUMA 296	Directed Study	1 cr. - 3 cr.
HUMA 311	Engineering Communication	3 cr.
HUMA 395	Islam and the Discourse of the Enlightenment	3 cr.

Language Courses

CHNA 101	Elementary Chinese I	3 cr.
JAPN 101	Elementary Japanese I	3 cr.
JAPN 102	Elementary Japanese II	3 cr.
KORA 101	Elementary Korean I	3 cr.
KORA 102	Elementary Korean II	3 cr.
SPAN 101	Elementary Spanish I	3 cr.

DEPARTMENT OF MATHEMATICS

Introduction

The Department of Mathematics plays a vital role in the mathematical education of all students at Khalifa University, both through the advanced courses offered to its own undergraduate majors as well as the service courses that it provides for all engineering and science programs. The mathematics curriculum, delivered by world-class instructors, enables the students to experience mathematics as a creative endeavor as well as an essential tool in the modeling and analysis of physical and social systems.

The department currently offers a BSc degree in Applied Mathematics and Statistics.

BACHELOR OF SCIENCE IN APPLIED MATHEMATICS AND STATISTICS

The BSc in Applied Mathematics and Statistics program offers training in mathematical problem-solving techniques with a reduced emphasis on abstract theory. The program is tailored to the student who will need to apply mathematical, statistical, and computational methods to practical problems.

Applied mathematics includes the theoretical portions of physics, chemistry, biomedicine, engineering, economics, finance, and a wide variety of other disciplines. Recent advances in computing technology have made the use of quantitative methods of even greater importance in these disciplines.

Prospects for employment opportunities for graduates in the mathematical and statistical sciences are excellent. There is a growing demand for professional mathematicians and statisticians in almost every sector of the job market, including the engineering and telecommunications industries; computer services and software development; actuarial and financial services; pharmaceutical industry and medical services; market research agencies; government laboratories and the military services; as well as academics and teaching.

Program Educational Objectives

- Graduates will meet the expectations of employers of applied mathematicians and statisticians.
- Qualified graduates will pursue advanced study if they so desire.

Student Learning Outcomes

Students graduating with a BSc in Applied Mathematics and Statistics will have achieved the following set of knowledge and performance based skills, and affective competencies:

- An ability to apply knowledge of mathematics, statistics and computing.
- An ability to design statistical experiments, as well as to analyze and interpret data.
- An ability to read, understand and construct mathematical and statistical proofs.
- An ability to function on a multi-disciplinary team as a member or leader.
- An ability to formulate, and to solve, mathematical models of real-world problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the strengths and limitations of mathematical and statistical models, and their solutions, in a global and societal context.
- A recognition of the need for, and an ability to engage in, life-long learning.
- A knowledge of contemporary issues.
- An ability to select, and use, appropriate software packages and/or computer programming to solve mathematical models.
- Familiarity with, and use of, sources of current research and an understanding of how new knowledge is generated.

Program Facilities

- All lectures are conducted in a traditional classroom setting using both the whiteboard and PowerPoint software.
- The laboratory classes are conducted in Computer Laboratories equipped with state of the art mathematical and statistical software packages.

Professional Chapters and Clubs

Students are encouraged to take up Undergraduate Membership of one, or more, of the professional mathematical societies such as the Institute of Mathematics and its Applications (IMA), the Society for Industrial and Applied Mathematics (SIAM), the Mathematical Association of America (MAA) or the American Mathematical Society (AMS). There is also an active on-campus student Math Club that organizes student-focused seminars and competitions.

Our students have participated in a number of local and regional conferences, the annual UAE Math Day in particular, and have presented the results of their research conducted in collaboration with department faculty.

University General Education Requirements

1. English Communication (8 credits)

ENGL 111	English Communication I	4 cr.
ENGL 112	English Communication II	4 cr.

2. Mathematics and Sciences (20 credits)

MATH 111	Calculus I	4 cr.
MATH 112	Calculus II	4 cr.
CHEM 115	Introduction to General Chemistry for Engineers	4 cr.
PHYS 121	University Physics I	4 cr.
PHYS 122	University Physics II	4 cr.

3. Business Studies (6 credits)

Two, three-credit, courses in Business Studies are required for all students, and one of these courses must be BUSS 322 Innovation and Private Enterprise in Science.

4. Humanities and Social Sciences (9 credits)

Three, three-credit, courses in Humanities and Social Sciences are required for all students.

Degree Requirements

To be recommended for the degree of BSc in Applied Mathematics and Statistics, students must satisfactorily complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements and the Applied Mathematics and Statistics core and Technical Electives requirements. The normal length of the undergraduate BSc in Applied Mathematics and Statistics program is 134 credits, comprising 43 credits of University General Education Requirements and 91 credits of specific Major requirements.

Applied Mathematics and Statistics Requirements

1. Additional Science, Computing and Business Requirements (10 credits)

Students must take the following three courses:

BIOL 101	Fundamentals of Biology	3 cr.
ENGR 113	Introduction to Computing using Matlab	4 cr.
BUSS 201	Fundamentals of Accounting and Finance	3 cr.

2. Science/Engineering/Free Electives (12 credits)

Students may select at most six credits of Free Elective courses within this requirement to develop depth and/or breadth of theoretical and/or experiential knowledge to support their career paths and individual interests, e.g. foreign language courses. For the remaining six credits students can choose from the following list to satisfy the Science/Engineering Elective requirements for Applied Mathematics and Statistics; additional courses may be approved by the department as Science/Engineering electives.

BMED 202	Biomedical Engineering Fundamentals	4 cr.
BMED 211	Physiological Systems and Modeling I	4 cr.
BMED 212	Physiological Systems and Modeling II	4 cr.
CHEM 211	Organic Chemistry	4 cr.
CHEM 311	Biochemistry	4 cr.
ECCE 230	Object-Oriented Programming	4 cr.
ISYE 200	Engineering Economic Analysis	3 cr.
ISYE 331	Stochastic Processes	3 cr.
ISYE 341	Simulation Modeling and Analysis	4 cr.
ISYE 351	Production, Operations and Inventory Management	3 cr.
ISYE 430	Supply Chain and Logistics	4 cr.
ISYE 431	Forecasting and Time Series	3 cr.
ISYE 441	Advanced Simulation	3 cr.
ISYE 451	Operations Research II	3 cr.
ISYE 480	Financial Engineering	3 cr.
MEEN 200	Statics	3 cr.
MEEN 201	Engineering Dynamics	3 cr.
MEEN 225	Engineering Materials	4 cr.
MEEN 240	Thermodynamics	3 cr.
MEEN 335	Fluid Mechanics	4 cr.

3. Applied Mathematics and Statistics Core Requirements (54 credits)

MATH 231	Calculus III	3 cr.
MATH 204	Linear Algebra	3 cr.
MATH 206	Differential Equations	3 cr.
MATH 243	Probability and Statistical Inference	3 cr.
ISYE 251	Operations Research I	4 cr.
MATH 214	Mathematical and Statistical Software	3 cr.
MATH 352	Elementary Theory and Applications of Functions of a Complex Variable	3 cr.
MATH 314	Real Analysis and Probability	4 cr.
MATH 315	Advanced Linear Algebra	3 cr.
MATH 316	Partial Differential Equations	3 cr.
MATH 317	Nonparametric Statistics	3 cr.
MATH 318	Multivariate Statistics	3 cr.
MATH 319	Numerical Analysis I	3 cr.
MATH 399	Internship	1 cr.
MATH 412	Optimization	3 cr.
MATH 419	Numerical Analysis II	3 cr.
MATH 497	Senior Research Project I	3 cr.
MATH 498	Senior Research Project II	3 cr.

Applied Mathematics and Statistics Technical Electives (15 credits)

To satisfy the BSc in Applied Mathematics and Statistics Technical Elective requirement, students must take courses from the following list. Students may be allowed to choose technical electives from the Financial Mathematics concentration and Mathematical Biology concentration with department approval.

MATH 411	Modern Algebra	3 cr.
MATH 413	Game Theory	3 cr.
MATH 414	Discrete Mathematics	3 cr.
MATH 415	Design of Experiments	3 cr.
MATH 416	Sample Survey Design and Analysis	3 cr.

Applied Mathematics and Statistics - Financial Mathematics (Concentration)

Students may select a Financial Mathematics Concentration before selecting the Science/Engineering Electives. A concentration at Khalifa University of Science and Technology leads to a specialized award or degree and will be specified on the diploma and the student's academic record.

The Financial Mathematics concentration requires the student to select BUSS 150 as their Business Elective and ISYE 480 from the list of Science/Engineering Electives and replace all technical electives with the following five courses.

MATH 421	Econometrics	3 cr.
MATH 422	Stochastic Differential Equations	3 cr.
MATH 423	Financial Risk Analysis	3 cr.
MATH 424	Optimal Control Theory	3 cr.
MATH 425	Financial Portfolio Management	3 cr.

Applied Mathematics and Statistics – Mathematical Biology (Concentration)

Students may select a Mathematical Biology Concentration before selecting their Science/Engineering Electives. A concentration at Khalifa University of Science and Technology leads to a specialized award or degree and will be specified on the diploma and the student's academic record.

The Mathematical Biology Concentration requires the student to select BMED 202, BMED 211 from the list of Science/Engineering Electives and replace all technical electives with the following five courses.

MATH 431	Computational Methods in Biology	3 cr.
MATH 432	Mathematical Models in Biology	3 cr.
MATH 433	Biostatistics	3 cr.
MATH 434	Bioinformatics	3 cr.
MATH 435	Mathematical Imaging	3 cr.

Typical Course Sequence for BSc in Applied Mathematics and Statistics

		FALL SEMESTER	SPRING SEMESTER
YEAR 1		ENGL 111 English Communication I	ENGL 112 English Communication II
		MATH 111 Calculus I	MATH 112 Calculus II
		CHEM 115 Introduction to General Chemistry for Engineers	PHYS 121 University Physics I
		BIOL 101 Fundamentals of Biology	ENGR 113 Introduction to Computing using Matlab
	S HUMA XXX Humanities and Social Sciences		
YEAR 2		MATH 231 Calculus III	MATH 352 Elementary Theory and Applications of Functions of a Complex Variable
		MATH 204 Linear Algebra	MATH 206 Differential Equations
		MATH 243 Probability and Statistical Inference	ISYE 251 Operations Research I
		PHYS 122 University Physics I	BUSS 201 Fundamentals of Accounting and Finance
	HUMA XXX Humanities and Social Sciences	MATH 214 Mathematical and Statistical Software	
	S HUMA XXX Humanities and Social Sciences		
YEAR 3		MATH 314 Real Analysis and Probability	MATH 316 Partial Differential Equations
		MATH 315 Advanced Linear Algebra	MATH 317 Nonparametric Statistics
		MATH 318 Multivariate Statistics	MATH 319 Numerical Analysis I
		Science/Engineering/Free Elective	Science/Engineering/Free Elective
	BUSS XXX Business Elective	Science/Engineering/Free Elective	
	S MATH 399 Internship		
YEAR 4		BUSS 322 Innovation and Private Enterprise in Science	MATH 413 Game Theory
		MATH 419 Numerical Analysis II	MATH 414 Discrete Mathematics
		MATH 412 Optimization	MATH 415 Design of Experiments
		MATH 411 Modern Algebra	MATH 416 Sample Survey Design and Analysis
	MATH 497 Senior Research Project I	MATH498 Senior Research Project II	
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**Typical Course Sequence for BSc in Applied Mathematics and Statistics
Concentration in Financial Mathematics**

FALL SEMESTER		SPRING SEMESTER		
YEAR 1	ENGL 111 English Communication I	4 cr.	ENGL 112 English Communication II	4 cr.
	MATH 111 Calculus I	4 cr.	MATH 112 Calculus II	4 cr.
	CHEM 115 Introduction to General Chemistry for Engineers	4 cr.	PHYS 121 University Physics I	4 cr.
	BIOL 101 Fundamentals of Biology	3 cr.	ENGR 113 Introduction to Computing using Matlab	4 cr.
S	HUMA XXX Humanities and Social Sciences	3 cr.		
YEAR 2	MATH 231 Calculus III	3 cr.	MATH 352 Elementary Theory and Applications of Functions of a Complex Variable	3 cr.
	MATH 204 Linear Algebra	3 cr.	MATH 206 Differential Equations	3 cr.
	MATH 243 Probability and Statistical Inference	3 cr.	ISYE 251 Operations Research I	4 cr.
	PHYS 122 University Physics II	4 cr.	BUSS 201 Fundamentals of Accounting and Finance	3 cr.
	HUMA XXX Humanities and Social Sciences	3 cr.	MATH 214 Mathematical and Statistical Software	3 cr.
S	HUMA XXX Humanities and Social Sciences	3 cr.		
YEAR 3	MATH 314 Real Analysis and Probability	4 cr.	MATH 316 Partial Differential Equations	3 cr.
	MATH 315 Advanced Linear Algebra	3 cr.	MATH 317 Nonparametric Statistics	3 cr.
	MATH 318 Multivariate Statistics	3 cr.	MATH 319 Numerical Analysis I	3 cr.
	Science/Engineering/Free Elective	4 cr.	Science/Engineering/Free Elective	4 cr.
	BUSS 150 Introduction to Economics	3 cr.	ISYE 480 Financial Engineering	3 cr.
S	MATH 399 Internship	1 cr.		
YEAR 4	BUSS 322 Innovation and Private Enterprise in Science	3 cr.	MATH 422 Stochastic Differential Equations	3 cr.
	MATH 419 Numerical Analysis II	3 cr.	MATH 423 Financial Risk Analysis	3 cr.
	MATH 412 Optimization	3 cr.	MATH 424 Optimal Control Theory	3 cr.
	MATH 421 Econometrics	3 cr.	MATH 425 Financial Portfolio Management	3 cr.
	MATH 497 Senior Research Project I	3 cr.	MATH 498 Senior Research Project II	3 cr.

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**Typical Course Sequence for BSc in Applied Mathematics and Statistics
Concentration in Mathematical Biology**

FALL SEMESTER		SPRING SEMESTER		
YEAR 1	ENGL 111 English Communication I	4 cr.	ENGL 112 English Communication II	4 cr.
	MATH 111 Calculus I	4 cr.	MATH 112 Calculus II	4 cr.
	CHEM 115 Introduction to General Chemistry for Engineers	4 cr.	PHYS 121 University Physics I	4 cr.
	BIOL 101 Fundamentals of Biology	3 cr.	ENGR 113 Introduction to Computing using Matlab	4 cr.
S	HUMA XXX Humanities and Social Sciences	3 cr.		
YEAR 2	MATH 231 Calculus III	3 cr.	MATH 352 Theory and Applications of Functions of a Complex Variable	3 cr.
	MATH 204 Linear Algebra	3 cr.	MATH 206 Differential Equations	3 cr.
	MATH 243 Probability and Statistical Inference	3 cr.	ISYE 251 Operations Research I	4 cr.
	PHYS 122 University Physics II	4 cr.	BUSS 201 Fundamentals of Accounting and Finance	3 cr.
	HUMA XXX Humanities and Social Sciences	3 cr.	MATH 214 Mathematical and Statistical Software	3 cr.
S	HUMA XXX Humanities and Social Sciences	3 cr.		
YEAR 3	MATH 314 Real Analysis and Probability	4 cr.	MATH 316 Partial Differential Equations	3 cr.
	MATH 315 Advanced Linear Algebra	3 cr.	MATH 317 Nonparametric Statistics	3 cr.
	MATH 318 Multivariate Statistics	3 cr.	MATH 319 Numerical Analysis I	3 cr.
	BMED 202 Biomedical Engineering Fundamentals	4 cr.	BMED 211 Physiological Systems and Modeling	4 cr.
	BUSS XXX Business Elective	3 cr.	Science/Engineering/Free Elective	4 cr.
S	MATH 399 Internship	1 cr.		
YEAR 4	BUSS 322 Innovation and Private Enterprise in Science	3 cr.	MATH 432 Mathematical Models in Biology	3 cr.
	MATH 419 Numerical Analysis II	3 cr.	MATH 433 Biostatistics	3 cr.
	MATH 412 Optimization	3 cr.	MATH 434 Bioinformatics	3 cr.
	MATH 431 Computational Methods in Biology	3 cr.	MATH 435 Mathematical Imaging	3 cr.
	MATH 497 Senior Research Project I	3 cr.	MATH 498 Senior Research Project II	3 cr.

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DEPARTMENT OF PHYSICS

Introduction

The Department of Physics is an academic unit within the College of Arts and Sciences. This department does not currently offer any undergraduate degree programs; however, it does provide courses which support all undergraduate degree programs across the University. The courses currently offered are listed below:

Physics Courses

PHYS 121	University Physics I	4 cr.
PHYS 122	University Physics II	4 cr.
PHYS 295	Introduction to Quantum Mechanics	3 cr.





COLLEGE OF ENGINEERING

One of the main pillars of Abu Dhabi's social, political and economic future is a sustainable knowledge-based economy, as outlined in the Abu Dhabi Vision 2030. The overarching purpose of the College of Engineering at the Khalifa University of Science and Technology is to work towards this vision by advancing the discovery of new knowledge, its dissemination and exploitation. The College of Engineering is distinguishing itself as a major contributor towards economic diversification within Abu Dhabi and the region, particularly through its close alignment with growing regional industries in key themes such as energy, aerospace, healthcare, transportation and telecommunications.

The College of Engineering is a vibrant community of academic scholars, students and staff who are dedicated to engineering education and innovation for the ultimate benefit of society. The College empowers students with a great sense of purposeful academic curiosity of the physical world and appreciation of the social and environmental context within a rapidly changing world.

COLLEGE MISSION

The College of Engineering serves the Emirate of Abu Dhabi, the nation, and the world by providing students with holistic education underpinned by the principle of engineering with a purpose, thus empowering them to be outstanding leaders in discovering new knowledge as a catalyst for business innovation, particularly towards the Abu Dhabi Vision 2030. The College also plays an integral role towards this vision by conducting cutting edge fundamental, multidisciplinary and translational research in key strategic areas such as information and communication technology, aerospace, transport and logistics, healthcare, and energy and the environment.

COLLEGE VISION

To be a world class centre of excellence in engineering education, research, and knowledge transfer and hence be a catalyst for economic development in the Emirate of Abu Dhabi and the UAE.

COLLEGE UNDERGRADUATE DEGREE PROGRAMS

The undergraduate degree programs offered by the College of Engineering are:

- Bachelor of Science (BSc) in Aerospace Engineering
- Bachelor of Science (BSc) in Biomedical Engineering
- Bachelor of Science (BSc) in Chemical Engineering
- Bachelor of Science (BSc) in Civil Engineering
- Bachelor of Science (BSc) in Computer Engineering
- Bachelor of Science (BSc) in Computer Engineering – Software Systems
- Bachelor of Science (BSc) in Electrical Engineering
- Bachelor of Science (BSc) in Industrial and Systems Engineering
- Bachelor of Science (BSc) in Mechanical Engineering
- Bachelor of Science (BSc) in Petroleum Engineering

The length of the undergraduate engineering programs ranges between 136-139 credits. These credits are divided into 43 credits of University General Education Requirements (GERs), minimum 27 credits of College of Engineering Requirements (CERs), and 66-69 credits of specific Major requirements.

COLLEGE UNDERGRADUATE MINORS

The minors offered by the College of Engineering are:

- Minor in Nuclear Engineering
- Minor in Unmanned Aerial Vehicles (UAVs)

UNIVERSITY GENERAL EDUCATION REQUIREMENTS (43 CREDITS)

1. English Communication (8 credits):

ENGL111 English Communication I (4 cr.)

ENGL112 English Communication II (4 cr.)

2. Math/Science (20 credits):

CHEM115 General Chemistry I	(4 cr.)
PHYS121 University Physics I	(4 cr.)
PHYS122 University Physics II	(4 cr.)
MATH111 Calculus I	(4 cr.)
MATH112 Calculus II	(4 cr.)

3. Math/Science (20 credits):

Two 3-credit courses in Business/Economics are required for all students. For the College of Engineering, BUSS 322 cannot be used to satisfy Business/Economics requirement.

4. Humanities and Social Sciences Electives (9 credits):

Three 3-credit courses in the Humanities and Social Sciences are required for all students. Language courses may not be used to fulfil Humanities and Social Sciences requirement. Students must take at least one course in the area of Islamic Studies and Culture. The current list of courses in this area (Islamic Studies and Culture) includes: HUMA102 Islamic Culture, HUMA111 Islamic History, HUMA112 Sciences in Islam, HUMA210 Introduction to Islamic Law, and HUMA211 Islam and Modernity. The Office of Registration keeps an updated list of the approved courses in this category.

COLLEGE OF ENGINEERING REQUIREMENTS (27 CREDITS)**1. Additional Math/Science (12 credits):**

In addition to the 20 credits of Math/Science GERs, a minimum of 12 credits of major-dependent Math/Science courses are required by the College of Engineering.

2. General Engineering (12 credits):

ENGR111 Engineering Design	(4 cr.)
ENGR112/113 Introduction to Computing	(4 cr.)
ENGR311 Innovation and Entrepreneurship in Engineering Design	4 cr.)

3. Free Electives (3 credits):

All students must complete at least 3 credits of free electives which are intended to provide students with flexibility to support their career paths and individual interests. They will support the development of technical expertise within the student's disciplines, undergraduate research and independent study opportunities, or a minor outside engineering. They can also be used for an additional Humanities and Social Sciences course or any other course offered by the University.

An Engineering program with a concentration may replace the 3 credits of free electives with a required 3-credit concentration course.

DEPARTMENT OF AEROSPACE ENGINEERING

The continued global expansion of the aviation and aerospace industries is driving a strong demand for aerospace engineers. In the UAE, as well as the Middle East, the aerospace industry has continued to expand at a rate significantly above the global average. The geographic and economic positions of the UAE are two of the drivers spurring the growth of aircraft manufacturing, maintenance repair-overhaul (MRO) facilities, and space-related industries.

BACHELOR OF SCIENCE IN AEROSPACE ENGINEERING

A BSc in Aerospace Engineering program lays the foundation for the core aerospace engineering discipline while engaging students to study and understand how engineering fits within the overall global aerospace and space-related profession and industry. Principles of science and engineering are applied to design and analysis of flight vehicles and related aerospace systems in well-designed course sequences to ensure that students gain hands on experience in developing flight vehicles from concept to design, including the fabrication and testing processes. Using advanced computer modeling and simulations, as well as hands-on laboratories and real-life projects, students are equipped with the tools to contribute immediately and effectively to the aerospace and the blooming space industries in UAE and the region.

Program Educational Objectives

- Graduates will meet the expectations of employers of aerospace engineers.
- Qualified graduates will pursue advanced study if they so desire.

Student Learning Outcomes

Students graduating with a BSc in Aerospace Engineering will attain the following:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Facilities

The Aerospace Engineering Program laboratories include:

- Computer-Aided Design Laboratory
- Mechanics of Solids Laboratory
- Material Testing Laboratory
- Aerodynamics Laboratory
- Dynamic Systems/ Vibrations Laboratory
- Space Dynamics Laboratory
- Thermodynamics Laboratory

Professional Chapters**AIAA Student Chapter**

The objectives of the American Institute of Aeronautics and Astronautics (AIAA) student chapter is to promote the profession of aerospace engineering through organized activities in the areas of academic study and research, and to offer quality engineering experiences that cannot be obtained in the classroom environment

The goal of the University AIAA student chapter is:

- To promote aerospace engineering to students.
- To establish links between students and aerospace companies through a series of industrial trips.
- To encourage students to participate in AIAA competitions, such as the design build and fly competition.

Chapter membership is open to both undergraduate and graduate students from the Khalifa University of Science and Technology. Any student who is enrolled as a student in aerospace engineering or in any graduate-level degree program is eligible for membership of the chapter.

Degree Requirements

To be recommended for graduation with a BSc in Aerospace Engineering, students must satisfactorily complete the courses in the specified curriculum categories. These categories cover the University General Education Requirements (GER, 43 credits), College of Engineering Requirements (CER, 27 credits), as well as the Aerospace Engineering Core and Technical Electives requirements. The length of the program is 139 credits.

Additional Aerospace Engineering Math/Sciences Requirement (12 credits)

To satisfy the College of Engineering requirements, the BSc in Aerospace Engineering curriculum requires the following four Math courses in addition to the Math/Sciences required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

MATH204	Linear Algebra	3 cr.
MATH206	Differential Equations	3 cr.
MATH231	Calculus III	3 cr.
MATH333	Applied Engineering Mathematics	3 cr.

Aerospace Engineering Major Requirements (63 credits)

AERO200	Statics	3 cr.
AERO201	Engineering Dynamics	3 cr.
AERO215	Introduction to Aerospace Engineering	3 cr.
AERO220	Aerospace Materials	3 cr.
AERO225	Mechanics of Solids	4 cr.
AERO240	Thermodynamics	4 cr.
AERO321	Aerospace Structures	3 cr.
AERO335	Aerodynamics I	4 cr.
AERO336	Aerodynamics II	3 cr.
AERO350	Dynamic Systems and Control	4 cr.
AERO415	Aerospace Materials Manufacturing	3 cr.
AERO440	Aerospace Propulsion	3 cr.
AERO450	Flight Dynamics and Stability	3 cr.
AERO465	Space Mechanics and Control	3 cr.
AERO470	Aircraft Design Laboratory	3 cr.
AERO480	Aerospace Vehicle Performance	3 cr.
AERO497	Senior Design Project I	3 cr.
AERO498	Senior Design Project II	3 cr.
ECCE200	Fundamentals of Electronic Systems	4 cr.
ENGR399	Engineering Internship	1 cr.

Aerospace Engineering Electives (6 credits)

The following is a sample list of courses that will satisfy the technical electives in the Aerospace Engineering program. The student must select a total of six credits from this list. At most three credits of the technical electives may be at 300-level and at most three credits may be independent study. In addition, courses from the list below may be taken to satisfy the free electives requirement. Additional courses may be approved by the department as technical electives.

AERO391	Independent Study I	1-3 cr.
AERO 401	UAV Modeling and Control	3 cr.
AERO 402	UAV Sensing	3 cr.
AERO 403	UAV Navigation	3 cr.
AERO 404	UAV Systems	3 cr.
AERO426	Composite Materials Design	3 cr.
AERO430	Intermediate Aerodynamics	3 cr.
AERO431	Viscous Flows	3 cr.
AERO433	Introduction to Computational Fluid Dynamics	3 cr.
AERO435	Rotorcraft Aerodynamics and Performance	3 cr.
AERO441	Introduction to Combustion	3 cr.
AERO461	Aviation Management and Certification	3 cr.
AERO485	Spacecraft Design	3 cr.
AERO491	Independent Study II	1-3 cr.
AERO495	Special Topics in Aerospace Engineering	3 cr.
CIVE370	Introduction to Environmental Engineering	4 cr.
ENGR455	Finite Element Analysis	3 cr.
MEEN 360	Computational methods for Mechanical Engineers	3 cr.
MEEN343	Heat Transfer	4 cr.

Typical Course Sequence for a BSc in Aerospace Engineering

FALL SEMESTER		SPRING SEMESTER		
YEAR 1	ENGL 111 English Communication I	4 cr.	ENGL 112 English Communication II	4 cr
	MATH 111 Calculus I	4 cr.	MATH 112 Calculus II	4 cr
	CHEM 115 General Chemistry I	4 cr.	PHYS 121 University Physics I	4 cr
	ENGR 111 Engineering Design	4 cr.	ENGR 112 Introduction to Computing using C++	4 cr
S				
YEAR 2	HUMA XXX Humanities and Social Sciences*	3 cr.	MATH 204 Linear Algebra	3 cr
	PHYS 122 University Physics II	4 cr.	MATH 206 Differential Equations	3 cr
	MATH 231 Calculus III	3 cr.	AERO 201 Engineering Dynamics	3 cr
	AERO 200 Statics	3 cr.	AERO 215 Introduction to Aerospace Engineering	3 cr
	AERO 220 Aerospace Materials	3 cr.	AERO 225 Mechanics of Solids	4 cr
S				
YEAR 3	BUSS XXX Business Elective*	3 cr.	ENGR 311 Innovation & Entrepreneurship in Engineering Design	4 cr
	AERO 240 Thermodynamics	4 cr.	ECCE 200 Fundamentals of Electronic Systems	4 cr
	AERO 335 Aerodynamics I	4 cr.	AERO 321 Aerospace Structures	3 cr
	AERO 350 Dynamic Systems & Control	4 cr.	AERO 336 Aerodynamics II	3 cr
	MATH 333 Applied Engineering Mathematics	3 cr.	BUSS XXX Business Elective*	3 cr
S				
YEAR 4	ENGR 399 Engineering Internship			1 cr
	AERO 440 Aerospace Propulsion	3 cr.	AERO 415 Aerospace Material Manufacturing	3 cr
	AERO 450 Flight Dynamics and Stability	3 cr.	AERO 480 Aerospace Vehicle Performance	3 cr
	AERO 465 Space Dynamics and Control	3 cr.	AERO 498 Senior Design Project II	3 cr
	AERO 470 Aircraft Design Laboratory	3 cr.	Technical Elective	3 cr
	AERO 497 Senior Design Project I	3 cr.	Technical Elective	3 cr
	Free Elective	3 cr.	HUMA XXX Humanities and Social Sciences*	3 cr
TOTAL CREDIT HOURS		139		

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

DEPARTMENT OF BIOMEDICAL ENGINEERING

Biomedical Engineering (BME) is a discipline in which engineering science and technology are applied to problems in biology and medicine. It covers a wide spectrum of activities including the development of advanced micro-/nano-technologies and biomaterials for improved implantable medical devices; the engineering of molecular, cellular, and tissue approaches and constructs; and the enhancement and application of medical instrumentation and imaging technologies. Ultimately, these advances have significant potential for advancing scientific understanding of the human body and disease, for the development of advanced medical devices such as artificial organs and limbs, and for the overall improvement of human health.

The demand for biomedical engineers in the UAE and the region continues to expand in alignment with the growth of the medical industry, health care, and hospital facilities. Biomedical Engineering graduates will have opportunities both for employment in established biomedical companies and for entrepreneurial endeavours. They are well prepared for advanced educational opportunities in both masters and doctoral programs as well as in professional degrees including the Medical Doctor (MD) and the Masters in Public Health (MPH).

BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING

A BSc in Biomedical Engineering provides a solid foundation in both engineering and the life sciences. The curriculum integrates engineering and molecular and cellular biology into a single biomedical engineering core. In addition, each student selects an area of specialization that provides more depth in a selected area of biomedical engineering. The instructional program is designed to impart knowledge of contemporary issues relevant to the health challenges in the UAE and at the forefront of biomedical engineering research in student-centered, collaborative learning environments. The overall goal is to produce high quality engineers who will be leaders in their field and who are well equipped to pursue further graduate degrees, medical school, or professional careers.

Program Educational Objectives

- Graduates will meet the expectations of employers of biomedical engineers.
- Qualified graduates will pursue advanced study if they so desire.

Student Learning Outcomes

Students graduating with a BSc in Biomedical Engineering degree will attain the following:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Facilities

The Biomedical Engineering Program laboratories and facilities include:

- Organic Chemistry Laboratory
- Molecular Biology Laboratory
- Cell and Tissue Laboratory
- Electrophysiology Laboratory
- Human Movement Laboratory
- Biomaterials Testing Facilities
- Advanced Microscopy Facilities
- 3D Bioprinting Facilities

Degree Requirements

To be recommended for graduation with a BSc in Biomedical Engineering degree, students must satisfactorily complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements (GER, 43 credits), College of Engineering Requirements (CER, 27 credits), as well as the Biomedical Engineering Core and Technical/Free Electives requirements. The program includes a total of 138 credits of required coursework.

Additional Math/Science Requirements (12 credits)

To satisfy the College of Engineering requirements, BSc in Biomedical Engineering requires the following four Math and Science courses in addition to the Math/Sciences required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

MATH204	Linear Algebra	3 cr.
MATH206	Differential Equations	3 cr.
MATH242	Introduction to Probability and Statistics	3 cr.
BIOL101	Biology	3 cr.

Biomedical Engineering Core Requirements (50 credits)

BMED202	Biomedical Engineering Fundamentals	4 cr.
BMED211	Physiological Systems and Modeling I	4 cr.
BMED212	Physiological Systems and Modeling II	4 cr.
BMED321	Mechanics for Biomedical Engineers	4 cr.
BMED322	Functional Biomechanics	4 cr.
BMED331	Biotransport Phenomena	3 cr.
BMED341	Molecular and Cellular Physiology I	4 cr.
BMED342	Molecular and Cellular Physiology II	4 cr.
BMED351	Biomedical Circuits and Systems	4 cr.
BMED352	Fundamentals of Biomedical Signal Processing	4 cr.
ENGR399	Biomedical Engineering Internship	1 cr.
BMED497	Senior Design Project I	3 cr.
BMED498	Senior Design Project II	3 cr.
CHEM211	Organic Chemistry	4 cr.

Biomedical Engineering Technical Electives (12 credits)

The following is a sample list of courses that will satisfy the technical electives in the BSc in Biomedical Engineering.

BMED411	Biomaterials
BMED412	Regenerative Medicine
BMED413	Application of Bio-molecular Tools
BMED421	Physiological Control Systems
BMED422	Rehabilitation Engineering
BMED423	Biorobotics and Medical Devices
BMED430	Bioinformatics
BMED495	Special Topics in Biomedical Engineering
CHEM311	Biochemistry

Additional Free Electives (6 credits)

Biomedical Engineering students have six additional free-elective credits beyond the College of Engineering requirements for a total of nine Free Electives credits required for graduation.

Undergraduate Research in Biomedical Engineering

Students are provided research opportunities in the laboratories of the Biomedical Engineering faculty members. These research experiences can receive course credit using the Independent Study courses. These courses can be used as Free Electives. At most nine credits of Independent Study may be used for graduation.

Credits	BMED Independent Study Courses	
1-3 cr.	Independent Study II	BMED391
1-3 cr.	Independent Study III	BMED491

Typical Course Sequence for BSc in Biomedical Engineering

	FALL SEMESTER	SPRING SEMESTER
YEAR 1	ENGL111 English Communication 4 cr.	ENGL112 English Communication II 4 cr.
	MATH111 Calculus I 4 cr.	MATH112 Calculus II 4 cr.
	CHEM115 General Chemistry I 4 cr.	PHYS121 University Physics I 4 cr.
	ENGR111 Engineering Design 4 cr.	ENGR112 Introduction to Computing with C++ 4 cr.
S		
YEAR 2	MATH206 Differential Equations 3 cr.	MATH242 Introduction to Probability and Statistics 3 cr.
	PHYS122 University Physics II 4 cr.	MATH204 Linear Algebra 3 cr.
	BMED202 Biomedical Engineering Fundamentals 4 cr.	BMED212 Physiological Systems and Modeling II 4 cr.
	BMED211 Physiological Systems and Modeling I 4 cr.	CHEM211 Organic Chemistry 4 cr.
	BIOL101 Biology 3 cr.	BUSXXXX Business Elective* 3 cr.
S		
YEAR 3	ENGR311 I Innovation and Entrepreneurship in Engineering Design 4 cr.	BMED322 Functional Biomechanics 4 cr.
	BMED321 Mechanics for Biomedical Engineers 4 cr.	BMED331 Biotransport Phenomena 3 cr.
	BMED341 Molecular and Cellular Physiology I 4 cr.	BMED342 Molecular and Cellular Physiology II 4 cr.
	BMED351 Biomedical Circuits and Systems 4 cr.	BMED352 Fundamentals of Biomedical Signal Processing 4 cr.
	HUMAXXX Humanities and Social Sciences* 3 cr.	Free Elective 3 cr.
S	ENGR399 Engineering Internship 1 cr.	
YEAR 4	BMED497 Senior Design Project I 3 cr.	BMED498 Senior Design Project II 3 cr.
	HUMAXXX Humanities and Social Sciences* 3 cr.	Technical Elective 3 cr.
	Technical Elective 3 cr.	Technical Elective 3 cr.
	Technical Elective 3 cr.	Free Elective 3 cr.
	Free Elective 3 cr.	BUSXXXX Business Elective* 3 cr.
S	HUMAXXX Humanities and Social Sciences* 3 cr.	
TOTAL CREDIT HOURS		138

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

DEPARTMENT OF CHEMICAL ENGINEERING

The Chemical Engineering Department aims to provide a world class education in chemical engineering and related disciplines to produce engineers and future leaders who are capable of meeting or exceeding the needs and expectations in business, industry and academia in chemical engineering education, research and development. This is accomplished by providing appropriate mechanisms for technical exchange, collaboration, and employment of students. The department currently offers a BSc degree in Chemical Engineering.

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

The field of chemical engineering deals with the science and engineering of chemical reactions and separation processes. It applies physical and life sciences together with engineering and economic principles to produce, transform, transport, and properly use chemicals, materials and energy.

A BSc in Chemical Engineering program educates engineers to design, develop, and operate chemical processes by which chemicals, petroleum products, food, pharmaceuticals, and consumer goods can be produced economically and safely. The program incorporates extensive laboratory work and computer process simulation to reinforce the principles and concepts used in the classroom.

Program Educational Objectives

- Successful practice of the chemical engineering profession.
- Design and safe operation of process plants.
- Successful career in research and development.

Student Learning Outcomes

- Students graduating with a BSc in Chemical Engineering degree will attain the following:
- An ability to apply knowledge of mathematics, science, and engineering.
 - An ability to design and conduct experiments, as well as to analyze and interpret data.
 - An ability to design a system, component, or process to meet desired needs within realistic

- constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Facilities

The Chemical Engineering Program laboratories include:

- Catalysis Laboratory
- Computing Laboratory
- Instrumentation Laboratory
- Polymer Chemistry Laboratory
- Polymer Processing Laboratory
- Polymer Properties and Characterization Laboratory
- Reaction Engineering Laboratory
- Thermodynamics Laboratory
- Unit Operations Laboratory
- Petroleum Refinery Laboratory

Professional Chapters

The Chemical Engineering program is supported by a student chapter of the American Institute of Chemical Engineering (AIChE). The aim of the chapter is to promote chemical engineering and establish a bridge between the students and the professional community at large. AIChE holds regular meetings for its members and organizes social and technical activities open to all students.

Degree Requirements

To be recommended for graduation with a BSc in Chemical Engineering, students must satisfactorily complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements (GER, 43 credits), College of Engineering Requirements (CER, 29 credits), as well as Chemical Engineering Core and Technical Electives requirements. The normal length of the program is 136 credits.

Additional Math/Sciences Requirements (14 credits)

To satisfy the College of Engineering requirements, the BSc in Chemical Engineering requires the following Mathematics and Sciences courses in addition to the Math/Science required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

CHEM116	General Chemistry II	4 cr.
CHEM211	Organic Chemistry	4 cr.
MATH206	Differential Equations	3 cr.
MATH231	Calculus III	3 cr.

Chemical Engineering Core Requirements (52 credits)

CHEG205	Principles of Chemical Engineering	3 cr.
CHEG210	Introduction to Biochemical Engineering	3 cr.
CHEG213	Experimental Design	3 cr.
CHEG230	Chemical Engineering Thermodynamics I	3 cr.
CHEG232	Fluid Mechanics	4 cr.
CHEG312	Numerical Methods for Chemical Engineers	3 cr.
CHEG324	Mass Transfer	3 cr.
CHEG332	Chemical Engineering Thermodynamics II	4 cr.
CHEG335	Heat Transfer	4 cr.
CHEG350	Materials Science and Engineering	3 cr.
CHEG412	Process Dynamics and Control	4 cr.
CHEG443	Reaction Engineering	4 cr.
CHEG485	Separation Processes	4 cr.
CHEG497	Senior Design Project I	3 cr.
CHEG498	Senior Design Project II	3 cr.
ENGR399	Engineering Internship	1 cr.

Chemical Engineering Technical Electives (12 credits)

The following is a sample list of courses that will satisfy the Technical Electives requirement for the BSc in Chemical Engineering program. Students must select a total of 12 credits from this list. At most three credits of the technical electives may be at 300-level and at most three credits may be independent study. In addition, courses from the list below may be taken to satisfy the free electives requirement. Additional courses may be approved by the department as technical electives.

CHEG325	Fundamentals of Nanotechnology	3 cr.
CHEG380	Introduction to Polymer Science and Engineering	3 cr.
CHEG381	Polymer Chemistry and Reaction Engineering	3 cr.
CHEG391/491	Independent Study	3 cr.
CHEG395/495	Special Topics in Chemical Engineering	3 cr.
CHEG415	Combustion and Air Pollution Control	3 cr.
CHEG416	Corrosion Engineering	3 cr.
CHEG423	Gas Processing Engineering	3 cr.
CHEG424	Petroleum Refining and Processing	3 cr.
CHEG470	Industrial Catalysis	3 cr.
CHEG472	Water Treatment and Membrane Processes	3 cr.
CHEG488	Polymer Properties	3 cr.

Typical Course Sequence for a BSc in Chemical Engineering

FALL SEMESTER		SPRING SEMESTER		
YEAR 1	ENGL111 English Communication I	4 cr.	ENGL112 English Communication II	4 cr.
	MATH111 Calculus I	4 cr.	MATH112 Calculus II	4 cr.
	CHEM115 General Chemistry I	4 cr.	PHYS121 University Physics I	4 cr.
	ENGR111 Engineering Design	4 cr.	CHEM116 General Chemistry II	4 cr.
S				
YEAR 2	ENGR113 Introduction to Computing using Matlab	4 cr.	MATH206 Differential Equations	3 cr.
	PHYS122 University Physics II	4 cr.	CHEG210 Introduction to Biochemical Engineering	3 cr.
	MATH231 Calculus III	3 cr.	CHEG213 Experimental Design	3 cr.
	CHEM211 Organic Chemistry I	4 cr.	CHEG232 Fluid Mechanics	4 cr.
	CHEG205 Principles of Chemical Engineering	3 cr.	CHEG230 Chemical Engineering Thermodynamics I	3 cr.
S				
YEAR 3	ENGR311 Innovation and Entrepreneurship in Eng. Design	4 cr.	CHEG324 Mass Transfer	3 cr.
	CHEG312 Numerical Methods for Chemical Engineers	3 cr.	CHEG350 Materials Science and Engineering	3 cr.
	CHEG332 Chemical Engineering Thermodynamics II	4 cr.	BUSSXXX Business Elective*	3 cr.
	CHEG335 Heat Transfer	4 cr.	HUMAXXX Humanities and Social Sciences Elective*	3 cr.
	HUMAXXX Humanities and Social Sciences Elective*	3 cr.	Free Elective	3 cr.
S				
ENGR399 Engineering Internship				1 cr.
YEAR 4	CHEG497 Senior Design Project I	3 cr.	CHEG498 Senior Design Project II	3 cr.
	CHEG485 Separation Processes	4 cr.	CHEG412 Process Dynamics and Control	4 cr.
	CHEG443 Reaction Engineering	4 cr.	HUMAXXX Humanities and Social Sciences Elective*	3 cr.
	BUSSXXX Business Elective*	3 cr.	Technical Elective	3 cr.
	Technical Elective	3 cr.	Technical Elective	3 cr.
TOTAL CREDIT HOURS			136	

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

DEPARTMENT OF CIVIL INFRASTRUCTURE AND ENVIRONMENTAL ENGINEERING

Civil engineering is one of the broadest engineering disciplines, encompassing many interdependent technical specialties. Civil engineers plan, design, and supervise construction of a wide variety of facilities such as space stations, offshore structures, bridges, buildings, tunnels, highways, transit systems, dams, airports, irrigation projects, distribution facilities for water, and collection and treatment facilities for wastewater and hazardous wastes. Civil engineers give solutions to pollution, aging infrastructure, traffic congestion, energy needs, floods, earthquakes, urban development, and community planning. Graduates may work at established public and private organizations or in entrepreneurial endeavours. Future career opportunities for civil engineers may range from project management to collaboration with architects, contractors, and government officials on construction efforts.

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

The BSc in Civil Engineering program lays the foundation for core civil engineering disciplines while engaging students to study and understand the overall global civil engineering profession and industry. Principles of science and engineering are applied to the design and analysis of problems in civil engineering in well-designed course sequences to ensure that students gain hands on and problem-based learning experiences. The mission of BSc in Civil Engineering program at the Khalifa University of Science and Technology is to provide a high-quality education and prepare students for successful careers in this field.

Program Educational Objectives

- Graduates will meet the expectations of employers of civil engineers.
- Qualified graduates will pursue advanced study if they so desire.

Student Learning Outcomes

Students graduating with a BSc in Civil Engineering degree will attain the following:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or

process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Facilities

- Environmental Engineering Laboratory
- Geotechnical Materials Laboratory
- Structure Computing Laboratory
- Structural Materials Laboratory
- Transportation and GIS Laboratory

Professional Chapters

ASCE Student Chapter

The mission of American Society of Civil Engineers (ASCE) Student Chapter is to provide an enriching experience to its members and to build academic, social and professional relationships in addition to developing leadership, advocating lifelong learning and promoting professionalism. The Student Chapter conducts regular meetings with speakers from a variety of civil engineering fields on professional issues and technical topics. It organizes field trips in different related domains: Geotechnical, Structural, Construction and Environmental. Also, it participates in community service projects, ensures entries in national and international competitions, helps students participate in the ASCE Student Conferences and sends potential members to workshops for Student Chapter Leaders. The ASCE Student Chapter offers students an excellent opportunity to learn more about the civil engineering profession and to meet with the civil engineering professionals and learn from them.

Degree Requirements

To be recommended to graduate with a BSc in Civil Engineering degree, students must satisfactorily complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements (GER, 43 credits), College of Engineering Requirements (CER, 27 credits), as well as the Civil Engineering Core and Technical Electives requirements. The normal length of the program is 137 credits.

Additional Math/Sciences Requirements (12 credits)

To satisfy the College of Engineering Requirements, the BSc in Civil Engineering requires the following Math courses in addition to the Math/Sciences required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

MATH204	Linear Algebra	3 cr.
MATH206	Differential Equations	3 cr.
MATH231	Calculus III	3 cr.
MATH242	Introduction to Probability and Statistics	3 cr.

Civil Engineering Core Requirements (61 credits)

CIVE180	Engineering Graphics and Visualization	3 cr.
CIVE200	Statics	3 cr.
CIVE201	Engineering Dynamics	3 cr.
CIVE225	Mechanics of Solids	4 cr.
CIVE310	Geomatics	3 cr.
CIVE332	Fundamentals of Construction Engineering and Management	3 cr.
CIVE335	Fluid Mechanics	4 cr.
CIVE336	Civil Engineering Materials	4 cr.
CIVE338	Geotechnical Engineering	4 cr.
CIVE340	Behavior and Analysis of Structures	3 cr.
CIVE341	Design of Steel Structures	3 cr.
CIVE370	Introduction to Environmental Engineering	4 cr.
CIVE380	Transportation Engineering	3 cr.
CIVE442	Design of Concrete Structures	3 cr.
CIVE470	Foundation Engineering	4 cr.
CIVE497	Senior Design Project I	3 cr.
CIVE498	Senior Design Project II	3 cr.
ENGR399	Civil Engineering Internship	1 cr.
XXX xxx	Science Elective*	3 cr.

* The Science Elective should be approved by the Department.

Civil Engineering Technical Electives (6 credits)

The following is a sample list of courses that will satisfy the technical electives in the Civil Engineering program. Students must select a total of six credits from this list. At most three credits of the technical electives may be at 300-level and at most three credits may be independent study. In addition, courses from the list below may be taken to satisfy the free electives requirement. Additional courses may be approved by the department as technical electives.

CIVE391	Independent Study I	1-3cr.
CIVE450	Coastal Engineering	3 cr.
CIVE455	Blast Effects and Modern Protective Infrastructures	3 cr.
CIVE463	Water and Wastewater Treatment Technologies	3 cr.
CIVE465	Ground and Surface Water Hydrology and Contaminant Transport	3 cr.
CIVE469	Air Pollution	3 cr.
CIVE472	Pavement Design and Transportation	3 cr.
CIVE473	Structural Building Design	3 cr.
CIVE475	Earth Structures: Embankment, Slopes and Buried Structures	3 cr.
CIVE480	Project Management and Contract Administration	3 cr.
CIVE482	Project Control and Life Cycle Execution of Constructed Facilities	3 cr.
CIVE484	Project Planning, Scheduling and Control	3 cr.
CIVE485	Construction Project Management	3 cr.
CIVE488	Advanced Construction Management	3 cr.
CIVE491	Independent Study II	1-3 cr.
CIVE492	Urban Transit Planning and Operations	3 cr.
CIVE493	Airport Planning and Traffic Management	3 cr.
CIVE495	Special Topics in Civil Engineering	3 cr.

Typical Course Sequence for BSc in Civil Engineering

		FALL SEMESTER		SPRING SEMESTER	
YEAR 1	ENGL 111 English Communication I	4 cr	ENGL 112 English Communication II	4 cr	
	MATH 111 Calculus I	4 cr	MATH 112 Calculus II	4 cr	
	CHEM 115 General Chemistry I	4 cr	PHYS 121 University Physics I	4 cr	
	ENGR 111 Engineering Design	4 cr	ENGR 113 Introduction to Computing with Matlab	4 cr	
S	HUMA XXX Humanities and Social Sciences				3 cr
YEAR 2	MATH 204 Linear Algebra	3 cr	MATH 206 Differential Equations	3 cr	
	MATH 231 Calculus III	3 cr	MATH 242 Intro to Probability & Statistics	3 cr	
	PHYS 122 University Physics II	4 cr	CIVE 201 Engineering Dynamics	3 cr	
	CIVE 200 Statics	3 cr	CIVE 225 Mechanics of Solids	4 cr	
	CIVE 180 Engineering Graphics and Visualization	3 cr	CIVE 310 Geomatics	3 cr	
S	HUMA XXX Humanities and Social Sciences				3 cr
YEAR 3	CIVE 332 Fundamentals of Construction Engineering and Management	3 cr	CIVE 335 Fluid Mechanics	4 cr	
	CIVE 336 Civil Engineering Materials	4 cr	CIVE 338 Geotechnical Engineering	4 cr	
	CIVE 340 Behavior & Analysis of Structures	3 cr	CIVE 341 Design of Steel Structures	3 cr	
	Science Elective	3 cr	CIVE 380 Transportation Engineering	3 cr	
	CIVE 370 Introduction to Environmental Engineering	4 cr	ENGR 311 Innovation & Entrepreneurship in Engineering Design	4 cr	
S	ENGR 399 Engineering Internship				1 cr
YEAR 4	BUSS XXX Business Elective*	3 cr	BUSS XXX Business Elective*	3 cr	
	HUMA XXX Humanities and Social Sciences*	3 cr	CIVE 498 Senior Design Project II	3 cr	
	CIVE 442 Design of Concrete Structures	3 cr	Technical Elective	3 cr	
	CIVE 470 Foundation Engineering	4 cr	Technical Elective	3 cr	
	CIVE 497 Senior Design Project I	3 cr	Free Elective	3 cr	
TOTAL CREDIT HOURS				137	

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

The Electrical and Computer Engineering (ECE) Department aims to serve society by educating and inspiring forward looking professionals in the various fields of electrical and computer engineering, by creating, applying, and disseminating vital knowledge and technology, and by leading the professional activities of academia, industry and government.

ECE offers BSc degrees in Electrical Engineering and Computer Engineering (with an optional concentration in Software Systems), as well as MSc and PhD programs in ECE. ECE encompasses advanced communications and information systems, information security, e-services and networks, multimedia communications, and embedded systems. ECE faculty collaborate with the many research institutes at the University on research related to robotics, communications, semiconductors, etc. They also collaborate frequently with prestigious research laboratories around the world. ECE research is aligned with the 2030 Abu Dhabi strategic plan, which calls for diversification of the economy beyond oil and gas and promotes innovation, entrepreneurship and spinoffs in the semiconductor, energy, and ICT sectors, among others.

All ECE programs offer many benefits to business and industry. There is the opportunity to influence research and education, and to participate in long-range technical assessments of problems and directions in the field. Contacts with prospective employers are easily established; affiliates have early access to student resumes, and to student and faculty publications. Internships in local and national industry provide students with a complementary element to their education. The result of this interaction is greater excellence in both the research and teaching missions of the ECE department, whose vision is to achieve the stature of a world-class department and become the premiere technology hub in the Gulf region.

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

A BSc in Computer Engineering program is concerned with the design and development of computers and computer-based systems. It involves the study of hardware, software, and networking. The BSc in Computer Engineering degree provides a strong understanding of the relationship between computer hardware and software and all related issues. It is the key to many career opportunities in both government and industry sectors. Students are offered opportunities to customize their education by selecting from a pool of technical elective courses. The Khalifa University of Science and Technology's program also gives students the opportunity to specialize in software systems.

Program Educational Objectives

- Graduates will meet the expectations of employers of computer engineers.
- Qualified graduates will pursue advanced study if they so desire.

Student Learning Outcomes

Students graduating with a BSc in Computer Engineering degree will attain the following:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues

An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.



Program Facilities

The Computer Engineering Program laboratories include:

- Analog Electronics Laboratory
- Digital & Embedded Systems Laboratory
- Computer Networks Laboratory
- Software Engineering Laboratory
- Power Systems Laboratory
- Projects Laboratory
- Communication Systems Laboratory
- Control System Laboratory

Professional Chapters

IEEE Student Chapter

The Institute of Electrical and Electronics Engineers (IEEE) is the world's largest professional association for the advancing of technology. The IEEE student chapter aims to prepare students to face challenges of the outside world and equip them with all the sufficient knowledge of their own field as well as being distinguished by their awareness of other fields' progress and their ability to communicate with others. IEEE and its members encourage a global community through IEEE's highly cited publications, conferences, technology standards, and professional and educational activities.

The IEEE student section vision is a continuous, successful and productive student branch that holds new and innovative activities in both the scientific and social environments. Its mission is to be the definite article that merges all disciplines and activities into one big integrated multidisciplinary team of innovation and productivity.

The goals of the IEEE student chapter can be summarized as:

- Explain the importance of networking and resources through technical societies.
- Invite several qualified speakers to the campus form various backgrounds to share their experience and knowledge.
- Coordinate with the other student chapters of to conduct workshops, activities and conferences.

Degree Requirements

To be recommended for graduation with a BSc in Computer Engineering degree, students must successfully complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements (GER, 43 credits), the College of Engineering Requirements (CER, 27 credits), as well as Computer Engineering Core and Technical Electives requirements. Students may also opt for the degree concentration in Software Systems. The normal length of the program is 137 credits.

Additional Math/Sciences Requirements (15 credits)

To satisfy the College of Engineering Requirements, the BSc in Computer Engineering requires the following Math courses in addition to the Math/Sciences required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

MATH204	Linear Algebra	3 cr.
MATH206	Differential Equations	3 cr.
MATH232	Engineering Mathematics	3 cr.
MATH234	Discrete Mathematics	3 cr.
MATH243	Probability and Statistical Inference	3 cr.

Computer Engineering Core Requirements (52 credits)

ECCE210	Digital Logic Design	4 cr.
ECCE221	Electric Circuits I	4 cr.
ECCE230	Object Oriented Programming	4 cr.
ECCE302	Signals and Systems	3 cr.
ECCE312	Electronic Circuits and Devices	4 cr.
ECCE316	Microprocessor Systems	4 cr.
ECCE336	Introduction to Software Engineering	3 cr.
ECCE342	Data Structures and Algorithms	3 cr.
ECCE350	Computer Architecture and Organization	3 cr.
ECCE354	Operating Systems	3 cr.
ECCE356	Computer Networks	4 cr.
ECCE434	Database Systems	3 cr.
ECCE450	Embedded Systems	3 cr.
ECCE497	Senior Design Project I	3 cr.
ECCE498	Senior Design Project II	3 cr.
ENGR399	Engineering Internship	1 cr.

Computer Engineering Technical Electives (12 credits)

Students are required to take a total of 12 credits (four courses) from an approved technical electives list. At most three credits of the technical electives may be at 300-level and at most three credits may be independent study. Students can choose any course from the list to satisfy both their technical and/or free elective requirements as long as it is not a core requirement course in their program. Additional courses may be approved by the department as technical electives.

Computer Engineering – Software Systems (Concentration)

If students wish, they may select the Software Systems concentration before choosing the technical/free electives. Selecting a degree concentration at Khalifa University of Science and Technology leads to a specialized degree, which will be specified on the diploma and the student’s academic record (transcripts).

The Software Systems concentration requires the student to replace all technical electives (12 credits) and the free elective (3 credits) with the following five courses (15 credits).

ECCE330	System Analysis and Software Design	3 cr.
ECCE432	Introduction to Human Computer Interfaces	3 cr.
ECCE436	Software Testing and Quality Assurance	3 cr.
ECCE438	Software Architecture	3 cr.
ECCE444	Computer Security	3 cr.

Typical Course Sequence for a BSc in Computer Engineering

		FALL SEMESTER	SPRING SEMESTER
YEAR 1		ENGL 111 English Communication I 4 cr	ENGL 112 English Communication II 4 cr
		MATH 111 Calculus I 4 cr	MATH 112 Calculus II 4 cr
		CHEM 115 General Chemistry I 4 cr	PHYS 121 University Physics I 4 cr
		ENGR 111 Engineering Design 4 cr	ENGR 112 Introduction to Computing using C++ 4 cr
S			
YEAR 2		ECCE 210 Digital Logic Design 4 cr	MATH 206 Differential Equations 3 cr
		MATH 232 Electrical Engineering Mathematics 3 cr	HUMA XXX Humanities and Social Sciences* 3 cr
		PHYS 122 University Physics II 4 cr	MATH 243 Probability & Statistical Inference 3 cr
		MATH 204 Linear Algebra 3 cr	ECCE 221 Electric Circuits I 4 cr
	ECCE 230 Object-Oriented Programming 4 cr	BUSS XXX Business Elective* 3 cr	
S			
YEAR 3		ECCE 336 Introduction to Software Engineering 3 cr	ENGR 311 Innovation and Entrepreneurship in Engineering Design 4 cr
		ECCE 302 Signals and Systems 3 cr	ECCE 354 Operating Systems 3 cr
		ECCE 350 Computer Architecture and Organization 3 cr	ECCE 356 Computer Networks 4 cr
		MATH 234 Discrete Mathematics 3 cr	ECCE 312 Electronic Circuits and Devices 4 cr
		ECCE 316 Microprocessor Systems 4 cr	ECCE 342 Data Structures and Algorithms 3 cr
	ENGR 399 Engineering Internship 1 cr		
YEAR 4		HUMA XXX Humanities and Social Sciences* 3 cr	HUMA XXX Humanities and Social Sciences* 3 cr
		ECCE 450 Embedded Systems 3 cr	Technical Elective 3 cr
		ECCE 434 Database Systems 3 cr	Technical Elective 3 cr
		Technical Elective 3 cr	Free Elective 3 cr
		Technical Elective 3 cr	BUSS XXX Business Elective* 3 cr
	ECCE 497 Senior Design Project I 3 cr	ECCE 498 Senior Design Project II 3 cr	
S SUMMER			
TOTAL CREDIT HOURS			137

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

Typical Course Sequence for BSc in Computer Engineering with Software Systems Concentration

FALL SEMESTER		SPRING SEMESTER		
YEAR 1	ENGL 111 English Communication I	4 cr	ENGL 112 English Communication II	4 cr
	MATH 111 Calculus I	4 cr	MATH 112 Calculus II	4 cr
	CHEM 115 General Chemistry I	4 cr	PHYS 121 University Physics I	4 cr
	ENGR 111 Engineering Design	4 cr	ENGR 112 Introduction to Computing using C++	4 cr
S				
YEAR 2	ECCE 210 Digital Logic Design	4 cr	MATH 206 Differential Equations	3 cr
	MATH 232 Electrical Engineering Mathematics	3 cr	HUMA XXX Humanities and Social Sciences	3 cr
	PHYS 122 University Physics II	4 cr	MATH 243 Probability & Statistical Inference	3 cr
	MATH 204 Linear Algebra	3 cr	ECCE 221 Electric Circuits I	4 cr
	ECCE 230 Object-Oriented Programming	4 cr	BUSS XXX Business Elective*	3 cr
S				
YEAR 3	ECCE 336 Introduction to Software Engineering	3 cr	ENGR 311 Innovation and Entrepreneurship in Engineering Design	4 cr
	ECCE 302 Signals and Systems	3 cr	ECCE 354 Operating Systems	3 cr
	ECCE 350 Computer Architecture and Organization	3 cr	ECCE 356 Computer Networks	4 cr
	MATH 234 Discrete Mathematics	3 cr	ECCE 312 Electronic Circuits and Devices	4 cr
	ECCE 316 Microprocessor Systems	4 cr	ECCE 342 Data Structures and Algorithms	3 cr
S				
ENGR 399 Engineering Internship		1 cr		
YEAR 4	HUMA XXX Humanities and Social Sciences*	3 cr	HUMA XXX Humanities and Social Sciences*	3 cr
	ECCE 450 Embedded Systems	3 cr	ECCE 436 Software Testing and Quality Assurance	3 cr
	ECCE 434 Database Systems	3 cr	ECCE 438 Software Architecture	3 cr
	ECCE 330 System Analysis and Design	3 cr	ECCE 432 Introduction to Human Computer Interfaces	3 cr
	ECCE 444 Computer security	3 cr	BUSS XXX Business Elective*	3 cr
	ECCE 497 Senior Design Project I	3 cr	ECCE 498 Senior Design Project II	3 cr
		TOTAL CREDIT HOURS	137	

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

S SUMMER

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Electrical systems are at the heart of the new industrial revolution and they play a vital role that affects nearly every aspect of our modern daily lives. These systems require professional engineers for their design, development, commissioning and service. The demand for such engineers is growing in UAE because of the new and growing electrical and electronic industries.

The BSc in Electrical Engineering program offers students quality education that provides them with the knowledge, techniques and skills that will be needed by the next generation of highly qualified engineers. The program has well-designed core courses to ensure that students gain hands-on and problem-based learning experiences. The program also gives the students the opportunity to select technical electives from a large pool of courses in order to specialize in certain areas.

Program Educational Objectives

- Graduates will meet the expectations of employers of electrical engineers.
- Qualified graduates will pursue advanced study if they so desire.

Student Learning Outcomes

Students graduating with a BSc in Electrical Engineering degree will attain the following:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.

- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Facilities

The Electrical Engineering Program laboratories include:

- Analog Electronics Laboratory
- Computer Simulation Laboratory
- Digital & Embedded Systems Laboratory
- Electric Circuits Laboratory
- Electric Machines Laboratory
- Feedback Control Laboratory
- High Voltage Laboratory
- Industrial Automation Laboratory
- Microcontrollers Laboratory
- Measurements and Instrumentation Laboratory
- Computer Networks Laboratory
- Power Systems Laboratory
- Projects Laboratory
- Renewable Energy Laboratory
- Communication Systems Laboratory

Degree Requirements

To be recommended for graduation with a BSc in Electrical Engineering, students must successfully complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements (GER, 43 credits), the College of Engineering Requirements (CER, 27 credits), as well as Electrical Engineering Core and Technical Electives requirements. The normal length of the program is 137 credits.

Additional Math/Sciences Requirements (12 credits)

To satisfy the College of Engineering Requirements, the BSc in Electrical Engineering requires the following Math courses in addition to the Math/Sciences required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

MATH204	Linear Algebra	3 cr.
MATH206	Differential Equations	3 cr.
MATH232	Engineering Mathematics	3 cr.
MATH243	Probability and Statistical Inference	3 cr.

Electrical Engineering Core Requirements (49 credits)

ECCE210	Digital Logic Design	4 cr.
ECCE221	Electric Circuits I	4 cr.
ECCE222	Electric Circuits II	4 cr.
ECCE230	Object Oriented Programming	4 cr.
ECCE302	Signals and Systems	3 cr.
ECCE312	Electronic Circuits and Devices	4 cr.
ECCE316	Microprocessor Systems	4 cr.
ECCE320	Applied Electromagnetics	3 cr.
ECCE322	Electrical Machines	4 cr.
ECCE323	Feedback Control Systems	4 cr.
ECCE360	Communication Systems	4 cr.
ECCE497	Senior Design Project I	3 cr.
ECCE498	Senior Design Project II	3 cr.
ENGR399	Engineering Internship	1 cr.

Electrical Engineering Major Elective (3 credits)

Students are required to select, in consultation with their advisor, one of four courses for their major elective, which are important in various specialization areas. These four courses are:

ECCE402	Digital Signal Processing
ECCE406	Instrumentation and Measurements
ECCE411	Analog Integrated Circuits Design
ECCE421	Power Systems Analysis

Electrical Engineering Technical Electives (15 credits)

Students are required to take a total of 15 credits (five courses) from an approved technical electives list. At most three credits of the technical electives may be at 300-level and at most three credits may be independent study. Students can choose any course from the list to satisfy both their technical and/or free elective requirements as long as it is not a core requirement course in their program. Additional courses may be approved by the department as technical electives.

Electrical Engineering Tracks – (Optional)

Electrical Engineering students may select one of four available tracks before selecting their technical electives. At the Khalifa University of Science and Technology, a degree track is specified on the student’s academic record (transcripts). The four tracks are:

- Electronics
- Communications
- Power Systems
- Control and Instrumentation

All tracks require students to replace three technical electives (9 credits) with department-approved courses related to the selected track.

Typical Course Sequence for BSc in Electrical Engineering

		FALL SEMESTER	SPRING SEMESTER	
YEAR 1	ENGL 111 English Communication I	4 cr	ENGL 112 English Communication II	4 cr
	MATH 111 Calculus I	4 cr	MATH 112 Calculus II	4 cr
	CHEM 115 General Chemistry I	4 cr	PHYS 121 University Physics I	4 cr
	ENGR 111 Engineering Design	4 cr	ENGR 113 Introduction to Computing using Matlab	4 cr
S				
YEAR 2	MATH 232 Engineering Mathematics	3 cr	MATH 206 Differential Equations	3 cr
	PHYS 122 University Physics II	4 cr	MATH 243 Probability & Statistical Inference	3 cr
	MATH 204 Linear Algebra	3 cr	ECCE 210 Digital Logic Design	4 cr
	ECCE 221 Electric Circuits I	4 cr	ECCE 222 Electric Circuits II	4 cr
ECCE 230 Object-Oriented Programming	4 cr	ECCE 320 Applied Electromagnetics	3 cr	
S				
YEAR 3	BUSS XXX Business Elective*	3 cr	ENGR 311 Innovation and Entrepreneurship in Engineering Design	4 cr
	ECCE 302 Signals and Systems	3 cr	ECCE 323 Feedback Control Systems	4 cr
	ECCE 312 Electronic Circuits and Devices	4 cr	HUMA XXX Humanities and Social Sciences*	3 cr
	ECCE 322 Electrical Machines	4 cr	ECCE 316 Microprocessor Systems	4 cr
ECCE 360 Communication Systems	4 cr	Major Elective	3 cr	
S				
		ENGR 399 Engineering Internship	1 cr	
YEAR 4	HUMA XXX Humanities and Social Sciences*	3 cr	HUMA XXX Humanities and Social Sciences*	3 cr
	Technical Elective	3 cr	Technical Elective	3 cr
	Free Elective	3 cr	Technical Elective	3 cr
	Technical Elective	3 cr	BUSS XXX Business Elective*	3 cr
	Technical Elective	3 cr	ECCE 498 Senior Design Project II	3 cr
S SUMMER		ECCE 497 Senior Design Project I	3 cr	
			TOTAL CREDIT HOURS	137

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

List of approved ECE Technical Electives:

ECCE326	Introduction to Semiconductor Devices	4 cr.
ECCE330	System Analysis and Software Design	3cr.
ECCE336	Introduction to Software Engineering	3 cr.
ECCE341	Java and Network Programming	3 cr.
ECCE350	Computer Architecture and Organization	3 cr.
ECCE362	Digital Communications I	3 cr.
ECCE391	Independent Study I	1-3 cr.
ECCE401	Filter Synthesis	3 cr.
ECCE402	Digital Signal Processing	3 cr.
ECCE404	Microwave Circuits and Devices	3 cr.
ECCE406	Instrumentation and Measurements	3 cr.
ECCE408	Digital Systems Design	3 cr.
ECCE410	VLSI Systems Design	3 cr.
ECCE411	Analog Integrated Circuits Design	3 cr.
ECCE420	Industrial Automation	3 cr.
ECCE421	Power System Analysis	3 cr.
ECCE422	High Voltage Engineering	3 cr.
ECCE423	Power Electronics	3 cr.
ECCE424	Electrical Power Distribution Systems	3 cr.
ECCE425	Power System Stability and Control	3 cr.
ECCE426	Power Electronics for Renewables Integration	3 cr.
ECCE427	Power System Protection	3 cr.
ECCE428	Modern Control Systems	3 cr.
ECCE429	Digital Control Systems	3 cr.
ECCE432	Introduction to Human Computer Interfaces	3 cr.
ECCE436	Software Testing and Quality Assurance	3 cr.
ECCE438	Software Architecture	3 cr.
ECCE440	Distributed Systems	3 cr.
ECCE444	Computer Security	3 cr.
ECCE446	Network Security	3 cr.
ECCE448	Cloud Infrastructure and Services	3 cr.
ECCE450	Embedded Systems	3 cr.
ECCE454	Artificial Intelligence	3 cr.
ECCE456	Image Processing and Analysis	3 cr.

ECCE460	Wireless Communications	3 cr.
ECCE461	Advanced Digital Communications	3 cr.
ECCE462	Communication Systems Design and Prototyping	3 cr.
ECCE463	Information and Coding Theory	3 cr.
ECCE470	Antennas and Propagation	3 cr.
ECCE472	Optical Communications and Networks	3 cr.
ECCE481	Wireless Sensor Networks and Internet of Things	3 cr.
ECCE484	Satellite and Space Communications	3 cr.
ECCE491	Independent Study II	1-3 cr.
ECCE495	Special Topics in ECE	3 cr.

DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

Industrial and systems engineers make decisions concerning the best utilization of people, material, equipment and energy to minimize costs and make organizations successful. They are productivity, quality, efficiency and optimization experts. They use sophisticated mathematical and statistical tools to design facilities, processes, supply chains etc., and generate optimal operation plans to produce better products and deliver better services. They are vital for businesses to become and remain competitive within global markets.

Industrial and systems engineering (ISYE) requires strong analytical and creative thinking skills for effective decision-making. Industrial and systems engineers are thought leaders often known for their big picture thinking of any business or enterprise. Their ability to function on multidisciplinary teams consisting of several engineering disciplines offers them a rapid access to senior management positions.

ISYE graduates have the flexibility to work in a variety of sectors including manufacturing, production and operations, supply chain and logistics, transportation, healthcare, and financial systems. Career specializations include: production and operations managers, process engineers, quality managers, operations research analysts, supply chain managers and healthcare managers.

BACHELOR OF SCIENCE IN INDUSTRIAL AND SYSTEMS ENGINEERING

BSc in Industrial and Systems Engineering program provides a state-of-art undergraduate education to prepare students for successful and long-standing careers in the competitive global economy. The curriculum, led by world-class teachers, is based on strong fundamentals in operations research and is enriched by coursework that targets the specific needs of local industries. Students gain valuable industrial experience through a summer internship and also have the opportunity to participate in international exchange programs during their junior year.

Program Educational Objectives

- Graduates will meet the expectations of employers of industrial and systems engineers.
- Qualified graduates will pursue advanced study if they so desire.

Student Learning Outcomes

Students graduating with a BSc in Industrial and Systems Engineering degree will attain the following:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Facilities

- Human Factors Laboratory
- Supply Chain Operations Laboratory
- Production Laboratory
- lab

Professional Chapters IISE Student Chapter

The objectives of the Institute of Industrial and Systems Engineers (IISE) student chapter at the Khalifa University of Science and Technology (#671) is to promote the profession and practice of Industrial Engineering through organized effort in study, research and discussion of the fields of Industrial Engineering and the dissemination of knowledge thereby gained.

The goals of the chapter are to:

- Invite several professionals from Industry to campus to share their experiences and motivate the student body.
- Organize workshops, field-trips and other academic activities to help the development of student body.
- Organize and participate in events to help promote the discipline.
- Organize regional meetings and a conference with other IIE Chapters in the UAE and Middle East and North Africa to network with future colleagues from other universities.

Degree Requirements

To be recommended for graduation with a BSc in Industrial and Systems Engineering, students must satisfactorily complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements (GER, 43 credits), College of Engineering Requirements (CER, 27 credits), as well as the Industrial and Systems Engineering Core (59 credits) and Technical Electives (9 credits) requirements. The normal length of the program is 138 credits.

Additional Math/Sciences Requirements (12 credits)

To satisfy the College of Engineering Requirements, BSc in Industrial and Systems Engineering requires the following Math courses in addition to the Math/Sciences required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

MATH204	Linear Algebra	3 cr.
MATH206	Differential Equations	3 cr.
MATH231	Calculus III	3 cr.
MATH242	Introduction to Probability and Statistics	3 cr.

Industrial and Systems Engineering Core Requirements (59 credits)

ISYE200	Engineering Economic Analysis	3 cr.
ISYE201	Introduction to Industrial and Systems Engineering	3 cr.
ISYE251	Operations Research I	4 cr.
ISYE271	Modern Methods of Manufacturing	4 cr.
ISYE311	Quality Control and Reliability	4 cr.
ISYE331	Stochastic Processes	3 cr.
ISYE341	Simulation Modeling and Analysis	4 cr.
ISYE351	Production, Operations, and Inventory Management	3 cr.
ISYE352	Lean Manufacturing	3 cr.
ISYE360	Human Factors and Safety Engineering	4 cr.
ISYE361	Data and Information Engineering	3 cr.
ISYE362	Systems Project Management	3 cr.
ISYE430	Supply Chain and Logistics	4 cr.
ISYE451	Operations Research II	3 cr.
ISYE475	Facilities Planning and Warehousing	4 cr.
ISYE497	Senior Design Project I	3 cr.
ISYE498	Senior Design Project II	3 cr.
ENGR399	Internship	1 cr.

Industrial and Systems Engineering Technical Course Electives (9 credits)

The following is a sample list of courses that will satisfy the technical electives for the BSc in Industrial and Systems Engineering. Students must select a total of nine credits from this list. At most three credits of the technical electives may be at 300-level and at most three credits may be independent study. In addition, courses from the list below may be taken to satisfy the free electives requirement. Additional courses may be approved by the department as technical electives.

ISYE391	Independent Study I	1-3 cr.
ISYE401	Advanced Systems Engineering	3 cr.
ISYE422	Reliability	3 cr.
ISYE431	Time Series Forecasting	3 cr.
ISYE432	Advanced Stochastic Processes	3 cr.
ISYE433	Advanced Statistics	3 cr.
ISYE441	Advanced Simulation	3 cr.
ISYE445	Six-Sigma Methodology and Applications	3 cr.
ISYE461	Design of Human-Integrated Systems	3 cr.
ISYE480	Financial Engineering	3 cr.
ISYE481	Procurement and Supply Management	3 cr.
ISYE485	Stochastic Manufacturing and Service Systems	3 cr.
ISYE491	Independent Study II	1-3 cr.
ISYE495	Special Topics in Industrial and Systems Engineering	3 cr.

Typical Course Sequence for BSc in Industrial and Systems Engineering

	FALL SEMESTER	SPRING SEMESTER
YEAR 1	ENGL 111 English Communication I 4 cr	ENGL 112 English Communication II 4 cr
	MATH 111 Calculus I 4 cr	MATH 112 Calculus II 4 cr
	CHEM 115 General Chemistry I 4 cr	PHYS 121 University Physics I 4 cr
	ENGR 111 Engineering Design 4 cr	ENGR 112 Introduction to Computing with C++ 4 cr
S	HUMA XXX Humanities and Social Sciences* 3 cr	
YEAR 2	MATH 204 Linear Algebra 3 cr	MATH 231 Calculus III 3 cr
	MATH 242 Introduction to Probability and Statistics 3 cr	ISYE 200 Engineering Economic Analysis 3 cr
	PHYS 122 University Physics II 4 cr	ISYE 251 Operations Research I 4 cr
	ISYE 201 Intro to Industrial & Systems Engineering 3 cr	ISYE 271 Modern Methods of Manufacturing 4 cr
	BUSS 201 Fundamentals of Accounting & Finance 3 cr	MATH 206 Differential Equations 3 cr
S	HUMA XXX Humanities and Social Sciences* 3 cr	
YEAR 3	ISYE 311 Quality Control & Reliability 4 cr	ENGR 311 Innovation & Entrepreneurship in Engineering Design 4 cr
	ISYE 331 Stochastic Processes 3 cr	ISYE 362 Systems Project Management 3 cr
	ISYE 351 Production, Operations and Inventory Management 3 cr	ISYE 341 Simulation Modeling and Analysis 4 cr
	ISYE 361 Data and Information Engineering 3 cr	ISYE 352 Lean Manufacturing 3 cr
	Free Elective 3 cr	ISYE 360 Human Factors and Safety Engineering 4 cr
S	ENGR 399 Engineering Internship 1 cr	
YEAR 4	ISYE 430 Supply Chain and Logistics 4 cr	HUMA XXX Humanities and Social Sciences* 3 cr
	Technical Elective 3 cr	BUSS 301 Corporate Leadership and Human Resource Management 3 cr
	ISYE 451 Operations Research II 3 cr	Technical Elective 3 cr
	Technical Elective 3 cr	ISYE 475 Facilities Planning & Warehousing 4 cr
	ISYE 497 Senior Design Project I 3 cr	ISYE 498 Senior Design Project II 3 cr
	TOTAL CREDIT HOURS	138

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

DEPARTMENT OF MECHANICAL ENGINEERING

Mechanical engineers utilize their knowledge and skills across a wide range of industries. They play a major role in the design and manufacturing of complex engineering systems. The demand for mechanical engineers in the UAE will expand as the amount of manufacturing and industrial activity continues to grow. Mechanical devices ranging from automotive parts to power plants require mechanical engineers in the design, manufacturing and support processes, making them employable across multiple industries.

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

The BSc in Mechanical Engineering program is designed to provide comprehensive engineering education for students interested in mechanics, thermo-fluids, manufacturing, and controls and automation. Complex mechanical systems involve structures, advanced materials, sensors, and thermo-fluid systems. Students are exposed to this core engineering discipline through the study and application of the principles of engineering to a broad range of systems, ranging from nano-devices to large-scale power plants. Laboratories and industry-led projects allow graduates to be ready to create the next generation of ideas and products.

Program Educational Objectives

- Graduates will meet the expectations of employers of mechanical engineers in the UAE and beyond.
- Qualified graduates will pursue advanced study if they so desire.

Student Learning Outcomes

- Students graduating with a BSc in Mechanical Engineering will have attained the following:
- An ability to apply knowledge of mathematics, science, and engineering.
 - An ability to design and conduct experiments, as well as to analyze and interpret data.
 - An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety,

manufacturability, and sustainability.

- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Facilities

The Mechanical Engineering Program laboratories include:

- Robotics and Automation Laboratory
- Manufacturing Laboratory
- Technical Services Workshop
- Measurement and Instrumentation Laboratory
- Computer Aided Design Laboratory
- Computer Simulation Laboratory
- Materials Testing Laboratory
- Mechatronics & Control Laboratories
- Machine Workshop
- Fluid Mechanics Laboratory
- Heat Transfer & Thermodynamics Laboratory
- Solids Laboratory
- Composites Laboratory

Professional Chapters

ASME Student Chapter

The American Society of Mechanical Engineering (ASME) student chapter serves to help students become more professional and open-minded to new ideas. It aims to develop partnerships with industries, government agencies and other academic institutions. In addition, one of the ASME goals is to achieve international visibility by organizing and participating in technical conferences, seminars, lectures and competitions. It also seeks to offer online courses and workshops that develop engineering and communication skills.

Degree Requirements

To be recommended for graduation with a BSc in Mechanical Engineering degree, students must satisfactorily complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements (GER, 43 credits), College of Engineering Requirements (CER, 27 credits), as well as the Mechanical Engineering Core and Technical Electives requirements. The normal length of the program is 137 credits.

Additional Math/Sciences Requirements (12 credits)

To satisfy the College of Engineering Requirements, the BSc in Mechanical Engineering requires the following Math courses in addition to the Math/Sciences required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

MATH204	Linear Algebra	3 cr.
MATH206	Differential Equations	3 cr.
MATH231	Calculus III	3 cr.
MATH243	Probability and Statistical Inference	3 cr.

Mechanical Engineering Core Requirements (61 credits)

ENGR399	Engineering Internship	1 cr.
MEEN180	Computer Aided Design	3 cr.
MEEN200	Statics	3 cr.
MEEN201	Engineering Dynamics	3 cr.
MEEN225	Engineering Materials	4 cr.
MEEN240	Thermodynamics	3 cr.
MEEN325	Mechanics of Solids	4 cr.
MEEN335	Fluid Mechanics	4 cr.
MEEN343	Heat Transfer	4 cr.
MEEN350	Dynamic Systems and Vibration	3 cr.
MEEN356	Computer Controlled Systems	4 cr.
MEEN360	Computational Methods for Mechanical Engineers	3 cr.
MEEN370	Introduction to Manufacturing Processes	4 cr.
MEEN387	Machine Element Design	3 cr.
MEEN435	Turbomachinery	3 cr.
MEEN441	Applied Thermodynamics	3 cr.
MEEN484	Mechatronics	3 cr.
MEEN497	Senior Design Project I	3 cr.
MEEN498	Senior Design Project II	3 cr.

Mechanical Engineering Major/Technical Electives (6 credits)

The following is a sample list of courses that will satisfy the major/technical electives for the BSc in Mechanical Engineering. A major elective is a course from the department with MEEN code. A technical elective is selected from an approved list and can be taken from another major. At most one course of the major/technical electives may be at 300-level and at most three credits may be independent study. In addition, courses from the list below may be taken to satisfy the free elective requirement.

ENGR455	Finite Element Analysis	3 cr.
MEEN380	Introduction to Polymer Science	3 cr.
MEEN391	Independent Study I	1-3 cr.
MEEN405	Vibration Analysis	3 cr.
MEEN410	Viscous and Boundary Layer Flows	3 cr.
MEEN420	Materials Strength and Fracture	3 cr.
MEEN421	Mechanics of Deformable Solids	3 cr.
MEEN422	Fatigue and Fracture Analysis	3 cr.
MEEN439	Machine Dynamics	3 cr.
MEEN446	Internal Combustion Engines	3 cr.
MEEN450	Vehicle Engineering	3 cr.
MEEN454	Refrigeration, Air Conditioning &Cryogenics	3 cr.
MEEN465	Bioengineering	3 cr.
MEEN485	Introduction to Robotics	3 cr.
MEEN486	Sustainable Energy	3 cr.
MEEN491	Independent Study II	1-3 cr.
MEEN495	Special Topics in Mechanical Engineering	3 cr.

Typical Course Sequence for BSc in Mechanical Engineering

		FALL SEMESTER		SPRING SEMESTER	
YEAR 1	ENGL111 English Communication I	4 cr.	ENGL112 English Communication II	4 cr.	
	MATH111 Calculus I	4 cr.	MATH112 Calculus II	4 cr.	
	CHEM115 General Chemistry I	4 cr.	PHYS121 University Physics I	4 cr.	
	ENGR111 Engineering Design	4 cr.	ENGR113 Introduction to Computing using Matlab	4 cr.	
S					
YEAR 2	MEEN180 Computer Aided Design	3 cr.	MEEN201 Engineering Dynamics	3 cr.	
	PHYS122 University Physics II	4 cr.	MEEN225 Engineering Materials	4 cr.	
	MATH231 Calculus III	3 cr.	MEEN240 Thermodynamics	3 cr.	
	MATH204 Linear Algebra	3 cr.	MATH206 Differential Equations	3 cr.	
	MEEN200 Statics	3 cr.	MATH243 Probability and Statistical Inference	3 cr.	
S					
YEAR 3	ENGR311 Innovation and Entrepreneurship in Engineering Design	4 cr.	BUSXXXX Business Elective*	3 cr.	
	MEEN325 Mechanics of Solids	4 cr.	MEEN370 Introduction to Manufacturing Processes	4 cr.	
	MEEN335 Fluid Mechanics	4 cr.	MEEN343 Heat Transfer	4 cr.	
	MEEN350 Dynamic Systems and Vibration	3 cr.	MEEN356 Computer Controlled Systems	4 cr.	
	MEEN360 Computational Methods for Mechanical Engineers	3 cr.	MEEN387 Machine Element Design	3 cr.	
S					
		ENGR399 Engineering Internship		1 cr.	
YEAR 4	BUSXXXX Business Elective*	3 cr.	HUMAXXX Humanities and Social Sciences*	3 cr.	
	HUMAXXX Humanities and Social Sciences*	3 cr.	MEEN435 Turbomachinery	3 cr.	
	HUMAXXX Humanities and Social Sciences*	3 cr.	MEEN498 Senior Design Project II	3 cr.	
	MEEN484 Mechatronics	3 cr.	Major Elective	3 cr.	
	MEEN441 Applied Thermodynamics	3 cr.	Technical Elective	3 cr.	
	MEEN497 Senior Design Project I	3 cr.	Free Elective	3 cr.	
				TOTAL CREDIT HOURS	137

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

DEPARTMENT OF NUCLEAR ENGINEERING

The Department of Nuclear Engineering does not currently offer an undergraduate degree but students may choose the minor of nuclear engineering in many of the undergraduate degrees on offer at the Khalifa University of Science and Technology; although a minor in Nuclear Engineering is currently restricted to sponsored students from specific agencies. Interested students should check with the Registration Office to find out if they are eligible to enroll in this minor.

MINOR IN NUCLEAR ENGINEERING

The Minor in Nuclear Engineering is designed to provide undergraduate students from other appropriate engineering programs (mechanical, electrical, chemical etc.) with the fundamentals of nuclear physics and engineering theory and practice, necessary to equip them with a sound understanding of nuclear engineering.

The fundamental principle of nuclear power is to harness the energy released when a nuclear reaction results in the splitting of the uranium atom, a process called nuclear fission, which also results in the creation of ionizing radiation. The courses designed for this Nuclear Engineering Minor will cover the following three fundamental nuclear engineering areas of study necessary to achieve the program goals and learning outcomes given below:

1. Radiation Science and Health Physics
2. Nuclear Reactor Physics
3. Nuclear Systems and Operation

GOALS

The goals of the program are:

1. To provide graduates with fundamental knowledge in nuclear engineering.
2. To enable graduates to relate nuclear engineering theory to practice.
3. To equip graduates with design and problem solving skills in nuclear engineering.
4. To prepare graduates for careers as nuclear engineering professionals.
5. To encourage graduates to pursue self-learning and personal development experiences.

STUDENT LEARNING OUTCOMES

A student graduating with a Minor in Nuclear Engineering will be able to:

- a. Demonstrate a basic level of understanding in nuclear engineering.
- b. Practice a sound level of nuclear safety awareness and culture.
- c. Analyze and characterize existing nuclear engineering systems.
- d. Design the basics of a nuclear engineering system, component, or process to meet desired needs.
- e. Use the basic techniques, skills and modern tools necessary for nuclear engineering practice.
- f. Conduct supervised investigation in the field of nuclear engineering with rigor and discrimination.
- g. Communicate and write appropriately in the area of nuclear engineering.
- h. Understand the basics of regulatory and ethical issues and professional responsibility related to nuclear engineering.
- i. Realize the impact of nuclear engineering in a global and societal context.
- j. Recognize the need for, and engage in, life-long learning.

MINOR REQUIREMENTS

Students must take all five courses:

NUCE301 Radiation Science and Health Physics	3 cr.
NUCE302 Applied Mathematics for Nuclear Engineering (or MATH204 Linear Algebra and MATH206 Differential Equations.)	3 cr.
NUCE303 Mechanics and Thermal-hydraulics Principles for Nuclear Engineering (or MEEN343 Heat Transfer.)	3 cr.
NUCE401 Introduction to Nuclear Reactor Physics	3 cr.
NUCE402 Introduction to Nuclear Systems and Operation OR	3 cr.
NUCE403 Introduction to Nuclear Technology and Reactor Systems	3 cr.

DEPARTMENT OF PETROLEUM ENGINEERING

The Petroleum Engineering department aims to become a leading international center of excellence in education, training, research and professional service dedicated to serving the competence, training and technology development needs of the petroleum industry in general, and the Abu Dhabi National Oil Company (ADNOC) and other allied sponsors in particular. Our mission is to provide a platform for life-long learning while also emphasizing the importance of interdisciplinary approach, ethical conduct, and health, safety and environmental issues.

BACHELOR OF SCIENCE IN PETROLEUM ENGINEERING

The BSc in Petroleum Engineering program has a modern and well-balanced curriculum that emphasizes not only petroleum engineering fundamentals but also the business processes applied to reach optimal engineering solutions for field development and operations. This program is uniquely defined by well-equipped, state-of-the-art modern laboratory and computer facilities and access to local operating companies. The content of our courses, projects, and assignments are selected to help prepare graduates to launch their oil industry careers as willing and eager contributors. Students are well equipped with skills and knowledge of basic engineering and science, fundamental understandings of reservoir, well, and production and surface facilities.

Program Educational Objectives

The BSc in Petroleum Engineering aims to produce graduates who will be able to:

- Demonstrate the highest levels of technical, ethical and behavioral competencies.
- Develop and establish themselves as engineers and supervisors.
- Become competent engineers to serve the country's objectives.
- Undertake graduate studies and become involved in research and development.

Student Learning Outcomes

Students graduating with a BSc in Petroleum Engineering degree will attain the following:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multidisciplinary teams. The petroleum disciplines judged relevant to petroleum engineering are:
 - Petroleum sub-disciplines: drilling, production, reservoir engineering and formation evaluation
 - Knowledge of project management and data integration.
 - Geoscience disciplines

- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues pertaining to energy.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Facilities

The Petroleum Engineering Program laboratories include:

- Analytical Instrument Laboratory
- Core Preparation Laboratory
- Drilling Fluids Laboratory
- Drilling Simulation Laboratory
- Fluid Properties Laboratory
- Rock Mechanics Laboratory
- Rock Properties Laboratory
- Production and Facilities Laboratory

Professional Chapters

The Petroleum Engineering program is supported by a student chapter of the Society of Petroleum Engineers (SPE). Activities of the SPE student chapter are broadly divided into technical and social functions. Major technical activities include sponsoring students to conferences and Education Weeks organized annually by SPE in conjunction with major oil and gas conferences in the region, field trips, company visits, and technical presentations delivered by industry professionals. Students also participate in regional and international student paper contests where they can showcase their research skills, competing with other students for honors. Social activities include the annual Sports Day, dinners, dhow cruises, visits to other chapters, etc.

Degree Requirements

To be recommended for graduation with a BSc in Petroleum Engineering degree, students must satisfactorily complete the courses in the specified categories as set out below. The categories cover the University General Education Requirements (GER, 43 credits), College of Engineering Requirements (CER, 28 credits), as well as Petroleum Engineering Core and Technical Electives requirements. The normal length of the program is 138 credits.

Additional Math/Sciences Requirements (13 credits)

To satisfy the College of Engineering Requirements, the BSc in Petroleum Engineering requires the following Math courses in addition to the Math/Sciences required in GER: CHEM115, PHYS121, PHYS122, MATH111, and MATH112.

CHEM116	General Chemistry II	4 cr.
MATH206	Differential Equations	3 cr.
MATH231	Calculus III	3 cr.
PGEG221	Introduction to Geology and Geophysics	3 cr.

Petroleum Engineering Core Requirements (61 credits)

ENGR399	Engineering Internship	1 cr.
MEEN240	Thermodynamics	3 cr.
PEEG218	Reservoir Rock Properties	3 cr.
PEEG219	Reservoir Fluid Properties	3 cr.
PEEG252	Mechanics of Materials for PE	3 cr.
PEEG302	Fluid Mechanics and Heat Transfer	3 cr.
PEEG314	Well Logging	3 cr.
PEEG315	Reservoir Characterization	3 cr.
PEEG322	Drilling Engineering I	3 cr.
PEEG326	Drilling Engineering II	3 cr.
PEEG331	Reservoir Engineering I	3 cr.
PEEG334	Reservoir Engineering II	4 cr.
PEEG341	Completion and Work Over	3 cr.
PEEG436	Well Testing	3 cr.
PEEG442	Production Facilities	3 cr.
PEEG443	Production System Design and Analysis	3 cr.
PEEG460	Petroleum Economics and Risk Analysis	4 cr.
PEEG497	Senior Design Project I	3 cr.
PEEG498	Senior Design Project II	3 cr.
PGEG311	Sedimentary Petrology	4 cr.

Petroleum Engineering Technical Electives (6 credits)

The following is a sample list of courses that will satisfy the technical electives of the BSc in Petroleum Engineering. Students must select a total of six credits from this list. At most three credits of the technical electives may be at 300-level and at most three credits may be independent study. In addition, courses from the list below may be taken to satisfy the free electives requirement. Additional courses may be approved by the department as technical electives.

PEEG420	Well Treatment	3 cr.
PEEG423	Horizontal and Multilateral Well Technology	3 cr.
PEEG424	Underbalanced Drilling Technology	3 cr.
PEEG425	Pressure Control	3 cr.
PEEG437	Natural Gas Engineering	3 cr.
PEEG445	Production Enhancement	3 cr.
PEEG456	Petroleum Related Rock Mechanics	3 cr.
PEEG391/491	Independent Study in Petroleum Engineering	1-3 cr.
PEEG394/494	Research Topics in Petroleum Engineering	1-3 cr.
PEEG395/495	Special Topics in Petroleum Engineering	1-3 cr.

Typical Course Sequence for BSc in Petroleum Engineering

		FALL SEMESTER	SPRING SEMESTER
YEAR 1	S	ENGL111 English Communication I 4 cr.	ENGL112 English Communication II 4 cr.
		MATH111 Calculus I 4 cr.	MATH112 Calculus II 4 cr.
		CHEM115 General Chemistry I 4 cr.	PHYS121 University Physics I 4 cr.
		ENGR111 Engineering Design 4 cr.	CHEM116 General Chemistry II 4 cr.
YEAR 2	S	ENGR112/113 Introduction to Computing 4 cr.	MATH206 Differential Equations 3 cr.
		PHYS122 University Physics II 4 cr.	PEEG219 Reservoir Fluid Properties 3 cr.
		MATH231 Calculus III 3 cr.	PGEG221 Introduction to Geology and Geophysics 3 cr.
		PEEG218 Reservoir Rock Properties 3 cr.	PEEG252 Mechanics of Materials for PE 3 cr.
		MEEN240 Thermodynamics 3 cr.	PEEG302 Fluid Mechanics and Heat Transfer 3 cr.
YEAR 3	S		BUSS150 Introduction to Economics 3 cr.
		ENGR311 Innovation and Entrepreneurship in Engineering Design 4 cr.	PEEG315 Reservoir Characterization 3 cr.
		PGEG311 Sedimentary Petrology 3 cr.	PEEG326 Drilling Engineering II 3 cr.
		PEEG314 Well Logging 3 cr.	PEEG334 Reservoir Engineering II 4 cr.
		PEEG322 Drilling Engineering I 3 cr.	PEEG341 Completion and Work over 3 cr.
YEAR 4	S	PEEG331 Reservoir Engineering I	PEEG460 Petroleum Economics and Risk Analysis 4 cr.
		ENGR399 Engineering Internship 1 cr.	
SUMMER	S	HUMAXXX Humanities and Social Sciences* 3 cr.	BUSSXXX Business Elective* 3 cr.
		PEEG436 Well Testing 3 cr.	HUMAXXX Humanities and Social Sciences* 3 cr.
		PEEG442 Production Facilities 3 cr.	HUMAXXX Humanities and Social Sciences* 3 cr.
		PEEG443 Production System Design and Analysis 3 cr.	PEEG498 Senior Design Project II 3 cr.
		PEEG497 Senior Design Project I 3 cr.	Technical Elective 3 cr.
		Technical Elective 3 cr.	Free Elective 3 cr.

TOTAL CREDIT HOURS

138

*At least one Islamic Studies course must be taken from the Humanities Electives to meet graduation requirements. BUSS 322 cannot be used to satisfy Business elective requirement.

MINOR IN UNMANNED AERIAL VEHICLES (UAV)

Unmanned Aerial Vehicles (UAVs) are high-tech intelligent machines capable of traveling by air, land or sea without a human crew onboard, and are gaining increasing popularity and strategic significance worldwide. Powered with advanced computing technology, sensing capability and mechanical design, unmanned aerial vehicles are versatile machines able to maneuver in diverse, and dangerous environments. Equipped with sensors, a UAV could go into the heart of a storm or a spreading wildfire to monitor threats to human lives and property or travel through remote areas to gather environmental data.

The future development of UAV is an essential pillar to safety, security and sustainability, which are both highlights of the Abu Dhabi Vision 2030 strategy. The demand for expertise in this field requires highly educated individuals who understand the fundamentals of UAV in terms of design, engineering, operation and sensor data analysis. To this end, the objective of the Khalifa University of Science and Technology's Minor in UAV is to provide students with skills and experiences that will help them better apply the knowledge gained in their majors to specialized problems in the field of Unmanned Aerial Vehicles.

Goals

During the course of this minor, students will design, construct and test UAV systems. Topics covered will include platform design and construction, actuator and propulsion system design, sensing system design, auto-pilot system design and performance tuning, ground control station development, and UAV operation and interfacing.

Students will learn the theory and practice of modelling and controlling UAV systems, including the first-principles modelling and simulation of fixed-wing and rotorcraft UAVs, flight dynamics modelling via system identification, on-board flight control system design, and control performance tuning of the auto-pilot system. Students will also cover advanced topics on navigation systems for UAVs based and advanced sensing,

including trajectory planning, path planning, obstacle avoidance, and localization and mapping algorithms.

The UAV Minor is currently restricted to UAE Nationals. The students should check with the registration office to find out if they are eligible to enrol in this minor.

Minor Requirements

The UAV Minor consists of a minimum of 5 courses including AERO 401, AERO 402, AERO 403, and AERO 404 together with a background course MEEN 300 or ECCE 300, depending on the student's major.

MEEN300	System Dynamics and Control	3 cr.
ECCE300	Signals and Communications	3 cr.

MEEN 300 or ECCE 300 may be used by students to satisfy 3-credits of their major's free elective requirements.

AERO401	UAV Modeling and Control	3 cr.
AERO402	UAV Sensing	3 cr.
AERO403	UAV Navigation	3 cr.
AERO404	UAV Systems	3 cr.

Students may also take one of the above courses to satisfy 3-credits of their major's technical elective requirements, if approved by the student department's Chair

RESTRICTIONS

MEEN 300 System Dynamics and Control (3-0-3)

Students majoring in Aerospace and Mechanical Engineering are not allowed to take this course, rather they must take the combination AERO/MEEN201 and AERO/MEEN350

ECCE 300 Signals and Communications (3-0-3)

Students majoring in Electrical, Electrical and Electronic, Communication, or Computer Engineering are not allowed to take this course, rather they must take the combination ECCE302 and ECCE356 or ECCE360.

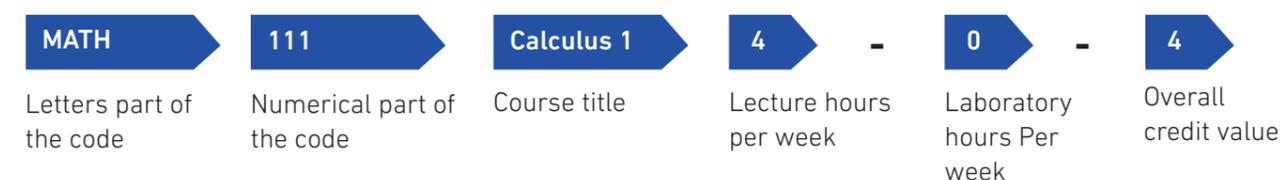
Course Title, Code and Credit Value

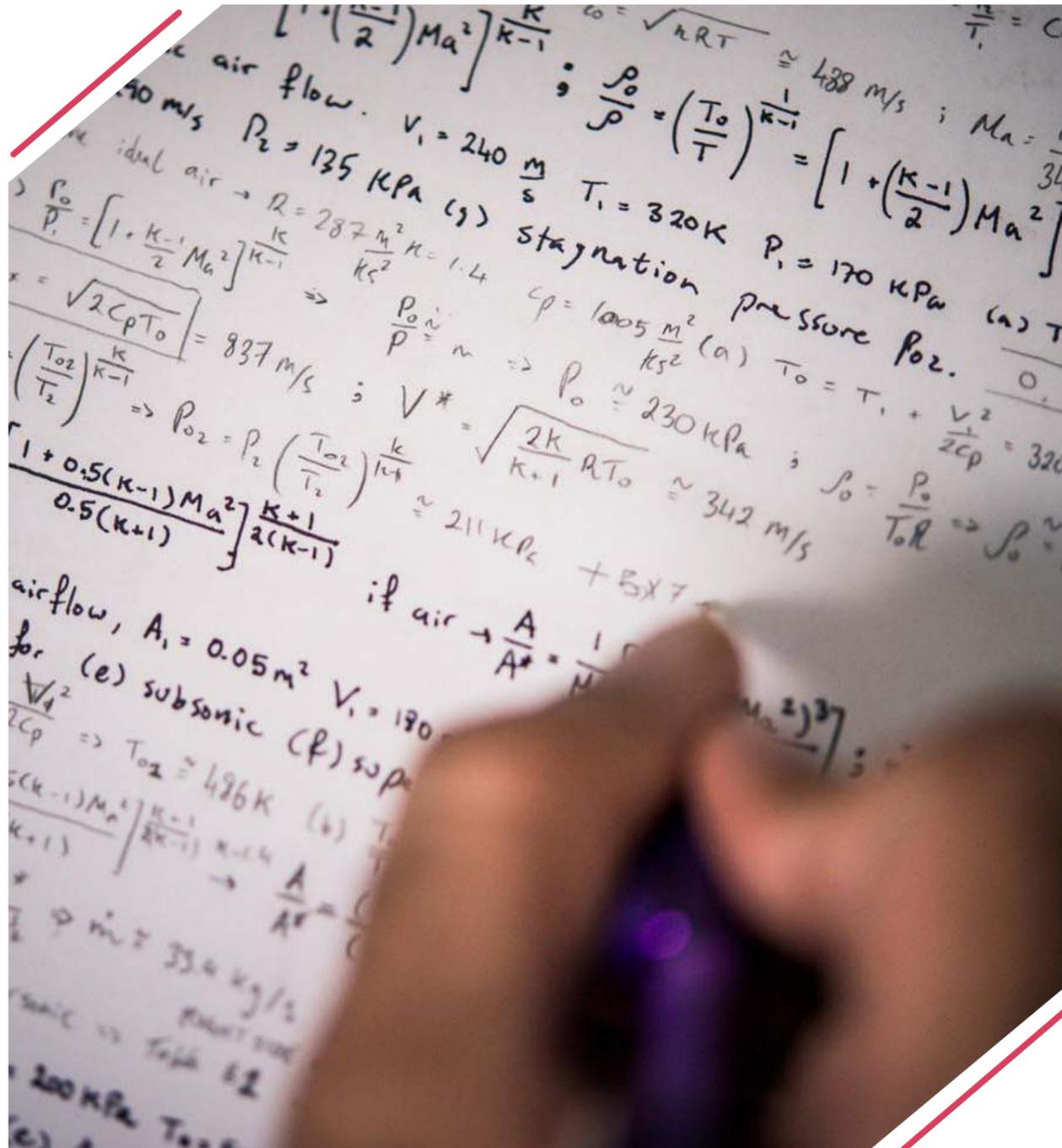
Each course offered at the University has a unique code, a title and a credit value. The course code consists of four letters that reflect its discipline or field of study, followed by a three-digit number that indicates its level. The title of the course gives an indication of its content.

The credit value of the course has three numbers:

- The first one gives the number of lecture hours per week;
- The second shows the number of laboratory or problem solving hours per week; and
- The third one gives the overall credit value of the course which will contribute to the particular degree requirements.

The example below further explains the course code and value information:





COURSE DESCRIPTIONS

COLLEGE OF ARTS AND SCIENCES COURSES

BIOL BIOLOGY

BIOL101

Fundamentals of Biology (2-2-3)

Prerequisite: None

This course introduces the structure and function of both animals and plants. It will introduce the principles of taxonomical classification of biological organisms. It will focus on the morphology and anatomy of biological organisms, as well as their physiological processes, life cycle, and behavior. Students will develop an understanding of the relationships that exist between animals, plants, and micro-organisms.

BUSS BUSINESS STUDIES

BUSS150

Introduction to Economics (3-0-3)

Prerequisite: ENGL112

This course introduces microeconomic concepts and analysis and provides an overview of macroeconomic issues. Topics studied include the nature and dimensions of competition, the concepts of demand and supply, theories of the firm and individual behavior, market structure, competition and monopoly, costs and incentives, wage determination, and employment, the determination of output, employment, unemployment, interest rates, and inflation. Monetary and fiscal policies are discussed.

BUSS201

Fundamentals of Accounting and Finance (3-0-3)

Prerequisite: None

This course introduces financial and management accounting. It is aimed at providing a broad understanding of the theory and practice of financial accounting, management accounting, and financial management, both for non-specialist students and as a foundation for further study in the area. This course examines the basic principles

and underlying concepts and the ways in which accounting statements and financial information can be used to improve the quality of decision-making.

BUSS202

Introduction to Organizational

Management (3-0-3)

Prerequisite: ENGL112

This course provides a basic introduction to contemporary business and organizational environments through the theory and practice of managerial functions (planning and decision making, organizing and changing, leading and controlling). Topics covered include organizational performance, risk management, stakeholder analysis, strategic planning, the operating environment and organizational culture.

BUSS296

Directed Study (1 to 3 credits)

Prerequisite: Approval of academic advisor and department chair.

Directed study gives students the opportunity to explore an area of interest without having extensive knowledge or experience in the subject area or field of study. As a result, faculty direction and guidance are critical. A formal written report is usually required.

BUSS301

Corporate Leadership and Human

Resource Management (3-0-3)

Prerequisite: Junior standing

This course teaches students to be informed future leaders through the combination of theoretical analysis and practical application. They are placed in a variety of real-life situations in which they apply the decision-making process in relation to organizational problem-solving and development. They integrate key leadership and human resource functions by means of acquiring data, planning methodically, formulating strategy, collaborating, and communicating with clarity.

BUSS322**Innovation and Private Enterprise in Science (3-0-3)**

Prerequisite: Junior standing

The goal of the course is to equip the next generation of leaders in the UAE with an innovative and entrepreneurial mindset and its related core skills. The course is composed of four modules designed to be taught over a fifteen-week semester. These comprise Innovation, Design Thinking, Entrepreneurship, and Leadership. A proportion of examples and cases are selected to complement students' majors in the College of Arts and Sciences.

BUSS395**Special Topics in Business Studies**

Prerequisite: Topic Specific

Course is repeatable if title and content differ.

CHEM CHEMISTRY**CHEM105****Health and Safety in Science (1-0-1)**

Prerequisite: None

This course introduces health and safety through science principles, ethics, and practices, emergency response, understanding laboratory hazards, minimizing, controlling and managing hazards. Upon completion of this course, students will be able to identify, evaluate and provide solutions to a wide range of hazards and risks to be found in science laboratory or industrial settings. This is a foundational course for all future science courses students will take.

CHEM106**Chemical Information Research Skills (2-2-3)**

Prerequisite: None

The overall goal of this course is for the student to gain a familiarity with chemistry as a 'language' (including its terminology, different chemical structure representations, different types of chemical information) and a basic working knowledge and skills to perform chemical information research, including SciFinder Scholar, in order to make their study/research more

efficient and gain an awareness of research work that has been done, in an era when the chemical literature is vast and constantly growing. In this course, students will learn about the organization of the chemical literature, important resources for navigating the literature of chemistry and selecting the most appropriate resource for their study/research needs. The information-seeking skills that students will learn in this course are also applicable to other related disciplines in sciences/engineering. Lectures of each topic will be accompanied by respective workshop session to allow students to actively implement what they are learning with direct supervision and to provide space for them to work on their project(s).

CHEM115**General Chemistry I (3-2-1-4)**

Prerequisite: None

This course presents a comprehensive study of the facts, concepts, and laws of chemistry. It includes the study of the fundamental principles and laws of chemistry including stoichiometric relationships, aqueous chemistry, the ideal gas laws and kinetic molecular theory, thermochemistry, quantum theory and electronic structure, periodic properties, and chemical bonding and molecular structure. The course is accompanied by a laboratory component that emphasizes quantitative procedures.

CHEM116**General Chemistry II (3-2-1-4)**

Prerequisite: CHEM105 (for CHEM majors); CHEM115 (for CHEM and Non-CHEM majors)

This is the second course in the General Chemistry series. Topical emphasis is placed on intermolecular forces, colligative properties of mixtures, chemical kinetics, acid-base equilibria, buffer systems, introductory acid-base titrations, solubility and complex equilibria, entropy and free energy. The importance of chemistry for both nuclear and environmental sciences is introduced.

CHEM200**Quantitative Methods in Physical Sciences (3-2-4)**

Prerequisite: CHEM116

This course will provide students with the mathematical tools needed throughout their chemistry degree. By the end of the course, students will be able to manipulate algebraic expressions, perform statistical analysis of experimental data, perform basic computational modelling experiments using the Spartan'16 code and be familiar with the use of Excel for performing regression analysis. Partial differentiation and integration of functions with more than one variable will be emphasized in the context of thermodynamics and chemical kinetics. Complex numbers, determinants, and matrices will be introduced with emphasis on specific applications in quantum chemistry. Foundational concepts in computational chemistry will also be introduced including but not limited to force fields, eigenvalue-eigenfunction equations and the use of electronic structure methods to calculate the properties of molecular orbitals for simple organic molecules.

CHEM221**Organic Chemistry I (3-3-4)**

Prerequisites: CHEM106; CHEM116

This course provides an introduction to naming, structure, bonding, reactivity, spectroscopy, and properties of organic compounds such as alkanes, alkenes, alkynes, alkyl halides, aromatic compounds, and alcohols in the views of atomic and molecular orbital theories. These basic principles are applied to a variety of topics ranging from chemical reactions to structure determination of organic compounds.

CHEM222**Organic Chemistry II (3-3-4)**

Prerequisite: CHEM221

This course provides an introduction to structure, conformation, stereochemistry, physical properties, spectroscopy and reactions of organic compounds such as aldehydes, ketones, carboxylic acids and derivatives, and amines. These basic principles are then applied to analysis of a variety biomolecules ranging from carbohydrates, lipids, proteins to

nucleic acids in terms of structure, function, and characterization.

CHEM231**Physical Chemistry I (3-2-1-4)**

Prerequisites: PHYS122; CHEM200

This course develops student understanding of chemical reactions and the properties of molecular systems. The properties of gas phase reactions will be derived starting from basic assumptions and equations of state using the kinetic theory of gases. Phase diagrams will be introduced in the context of gas-liquid equilibria. The fundamental postulates of quantum mechanics will be used to explain the observed atomic spectra of elements and diatomic molecules. The foundations of quantum mechanics introduced will be extended to the description of molecular orbitals using Hückel Theory. Finally, the First Law of Thermodynamics is introduced.

CHEM241**Introduction to Analytical Chemistry (3-3-4)**

Prerequisite: CHEM200

This course expands the fundamental aspects of aqueous chemical equilibria and electrochemistry learned in general chemistry, to introduce the basic principles and tools of quantitative chemical analysis in the context of precipitation, acid-base, complex-formation and redox reactions. Introduction to analytical chemistry is developed from the perspective of gravimetric, volumetric and electrochemical titrations, and use of statistical data treatment methods to assess and interpret experimental results. Application of these introductory analytical chemistry tools is demonstrated in context with a selection of example real samples.

CHEM330**Introduction to Computational Chemistry (4-0-4)**

Prerequisite: CHEM231

This introductory course in computational chemistry will introduce the principles of computational chemistry and computer-based molecular design. The content includes discussions of molecular mechanics, quantum mechanics, Hartree-Fock theory, semi-empirical

methods, density functional theory (DFT), basis sets, geometry optimization and transition state searches, conformational analysis, and prediction of molecular and spectroscopic properties. Students will learn the basic theory and algorithms underlying computational chemistry methods, and they will also learn the advantages and disadvantages of these methods and how to use them to solve problems of interest, e.g. involving macromolecules and supramolecules, in chemistry and molecular sciences. Students also will become familiar with several software packages listed under the Computer Resources.

CHEM311
Biochemistry (3-3-4)

Prerequisite: CHEM211

The overall goal of this course is for the student to gain a basic working knowledge of biochemical concepts and techniques which will be necessary for future scientific endeavors.

CHEM332
Physical Chemistry II (3-2-1-4)

Prerequisite: CHEM231

This course builds on the foundations of gas kinetics and thermodynamics introduced in Physical Chemistry I. The mathematical framework for rate laws will be extended to complex reaction mechanisms involving chain reactions and applications will be emphasized in polymerization processes and gas phase reactions in the upper atmosphere. Statistical mechanics will be used as a bridge between the microscopic properties of matter and their bulk properties. The spontaneity of chemical and physical processes will be explained by introducing the Second Law of Thermodynamics and the Gibbs and Helmholtz energies will be used to probe the maximum work that can be achieved by a chemical process. The chemistry of surfaces will be discussed regarding how atoms are deposited and grown on surfaces. Experimental methods for probing the composition and structure of surfaces will also be described. Finally, several case studies of how surface chemistry is applied to catalysis will be discussed.

CHEM342
Spectroscopic and Separation Methods in Analytical Chemistry (3-3-4)

Prerequisites: CHEM221; CHEM231; CHEM241

Co-requisite: CHEM351

This course is designed to provide a fundamental understanding of the core spectroscopic and separation techniques and methods used in chemical analysis. It spans atomic and molecular spectroscopy, mass spectrometry, gas chromatography, liquid chromatography in addition to liquid-liquid and liquid-solid phase extraction. Emphasis is placed on concepts, operational mechanisms, instrumentation, experimental procedures and practices for accurate qualitative and quantitative measurements, in addition to methodologies for data presentation, interpretation, and analysis.

CHEM343
Advanced Instrumental Analysis Techniques in Chemistry (3-3-4)

Prerequisites: CHEM342; CHEM351

This course provides a broad spectrum of advanced physical and chemical characterization techniques that can be applied to bulk or surface analysis of material properties such as, (i) microscopy, (ii) porosimetry, (iii) atomic and molecular spectroscopy, in addition to (iv) thermal energy-based approaches. Content introduces the basic principles of each technique, including instrumentation, operation mechanism, resolution, and depth of field, artefacts, interferences, detection limit, in addition to guidance on specimen preparation for a range of applications.

CHEM351
Main Group Compounds: Structure, Reactivity and Characterization (3-3-4)

Prerequisite: CHEM231

This course introduces and revises foundational concepts in inorganic chemistry; for example, solid structures, advanced acidity and basicity, redox chemistry and its representations, and symmetry, providing students with a greater breadth and depth of knowledge than obtained in previous General Chemistry courses. This course describes

the properties, compounds, and chemistry of the main-group elements, with an emphasis on rationalizing trends and behaviors based on these foundational concepts, and introduces techniques to characterize and quantify inorganic species. Course concepts are reinforced through application-focused group-based workshops.

CHEM352
Advanced Inorganic Chemistry (3-3-4)

Prerequisite: CHEM351

This course describes the properties, compounds and chemistry of the d- and f-block elements, including organometallics, thus providing students with an ability to rationalize trends and behaviors based on foundational concepts such as advanced understanding of electronic structure and coordination chemistry. It introduces students to the applications and boundaries of inorganic chemistry, including materials and nanomaterials, catalysis, and bioinorganic chemistry, with case studies such as inorganic chemistry in medicine, hydrogen-storage for energy applications and industrial catalysis. The course further develops advanced laboratory synthesis and characterization techniques in inorganic chemistry.

CHEM461
Environmental Chemistry (3-3-4)

Prerequisites: CHEM222; CHEM241; Senior Standing

This course lays the foundations for environmental chemistry sciences and provides a breadth of understanding of fundamental concepts and technical definitions associated with the field. It introduces the physical, chemical and biotic aspects of the natural environment, and particularly underpins the processes occurring within and among the lithosphere (soil), the hydrosphere (water), and the atmosphere (air). The course also surveys the main sources of air pollution that cause ozone depletion and consequential global warming due to photochemical smog process and greenhouse effect. Global climate change is further overviewed from the perspective of worldwide energy consumption from non-sustainable fossil fuels, trends in carbon dioxide emissions and alternative "green" approaches involving renewable technologies.

CHEM462
Pollution Science and Control - Management, Technology and Regulations (4-0-4)

Prerequisite: CHEM461

This course is designed to provide the fundamental knowledge widely applied in environmental assessment, protection, and management. It lays the foundations of environmental pollution science by underpinning the sources, movements, reactions, and fates of contaminants found in air, water and soil. Facets critical to pollution analysis and management are presented and elaborated to give a holistic picture on risk assessment, regulations, monitoring and mitigation technologies for waste management and water treatment.

CHEM463
Methods for Environmental Trace Analysis (3-3-4)

Prerequisites: CHEM342; CHEM461

This course is essential for chemistry majors wishing to pursue further studies or professional career in environmental monitoring, at quality control industries or regulator settings. The course introduces the students to a spectrum of analytical methodologies that can be applied towards the identification or determination of natural and anthropogenic species occurring in traces within the atmosphere, waters, soils and wastes, and their control by regulations and standards. Two generic trace analysis workflows are presented and distinguished according to "organic" or "inorganic" nature of the target species. The course particularly builds on separation and spectroscopic knowledge acquired through analytical chemistry courses to develop an understanding of the methodologies to be applied for studying environmental samples. Emphasis is placed on appropriating the sampling methods, sample handling and pre-treatment procedures to (i) matrix type (e.g., solid, liquid, and gas), (ii) sample abundance, (iii) stability of target species, (iv) interferences, and to making important considerations with regard to sample hazardousness and exposure risks. Selection of the most appropriate analytical characterization tool will be surveyed based on selectivity, sensitivity, detection limit, quantitation limit, and overall economic suitability.

CHEM471**Fundamentals of Forensic Science (4-0-4)**

Prerequisites: CHEM311; Senior Standing

Forensic science generally pertains to the application of scientific knowledge and methodologies to civil and criminal investigations within the justice system. This course provides an introductory understanding of forensic science and its various branching disciplines encompassing criminalistics, computer forensics, forensic biology, and toxicology, in addition to legal medicine, and applied anthropology and entomology. The course explores the principles and investigative approaches deployed through each discipline starting from crime scene analysis and the collection of evidence to the presentation of scientific findings in court.

CHEM472**Forensic Chemistry and Evidence Analysis (3-3-4)**

Prerequisites: CHEM342; CHEM471

Forensic chemistry is an essential branch in justice system. It applies chemistry and its allied sciences to the identification of unknown evidence materials recognized at a crime scene. This course particularly introduces the students to the forensic chemistry discipline by exploring a variety of modern chemical tools and procedures that can be used during a forensic investigation. Topics include ignitable liquids, explosives, controlled substances, polymer films, fibers, soils, glass, paints, fingerprints and gunshot residues. The course provides a stage-gate hands-on training experience on modern instrumentation applied in many professional forensic laboratories, including GC/MS, FTIR-ATR, Microscopy, SEM/EDS, etc... The laboratory component is particularly designed in context, using simulated crime scenarios and exposing students to example investigators' reports, suspects' and witnesses' statements.

CHEM481**Nanoscience and Nanotechnology (3-3-4)**

Prerequisites: CHEM332; CHEM343

Introduction to Nanoscience and Nanotechnology course provides students with the most modern concepts and applications of general scientific

principles in physics, chemistry, and biology at nanoscale. The course relies on the elementary concepts from physical and analytical chemistry, uses input from other branches of chemistry as needed, and aims to train students in understanding how the properties of matter fundamentally are altered at the nanoscale.

CHEM482**Nanochemistry (4-0-4)**

Prerequisites: CHEM222; Senior Standing

The goal of this course is to provide students with an introductory perspective on nanochemistry and its applications in various fields. Emphasis will be allocated to the design, synthesis, and functionalization of nanoparticles for practical applications. A variety of topics covering applications of nanoparticles in molecular imaging, drug delivery, devices, and sensors will be surveyed.

CHEM483**Polymer Chemistry (4-0-4)**

Prerequisites: CHEM222; Senior Standing

This course provides an introduction to the polymer chemistry with the emphasis of synthesis, structure, and characterization of polymeric materials, reaction mechanisms of various polymerization techniques, solution properties and phase behavior of polymers, mechanical and rheological properties of polymers.

CHEM301**Internship (0-0-1)**

Prerequisite: Minimum of 70 credits earned by end of the preceding Fall semester, including at least 24 credits in core major courses

Students are required to spend a minimum of 8 continuous weeks* on an approved internship program. The internship provides students with practical, on-the-job experience which allows them to integrate theory with "real world" situations. It is academically supervised by a faculty member and professionally supervised by the company's designated internship supervisor who provides feedback to the University about the student's progress. The student must keep a detailed log

book and prepare a formal report that documents the work undertaken during the internship period, and both of these must be submitted to the Department within the first two weeks of the semester following the internship. The report and the complete course activities are graded on Pass/Fail basis by the supervising faculty member, with input from the internship supervisor.

CHEM391**Independent Study I (Variable course credits from 1 to 3)**

Prerequisite: Junior Standing and approval of the department

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

CHEM491**Independent Study II (Variable course credits from 1 to 3)**

Prerequisite: Senior Standing and approval of the department

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

CHEM495**Special Topics in Chemistry (3-0-3)**

Prerequisite: Topic specific

This course mainly deals with new trends in Chemistry and related sciences. The course is repeatable if title and content differ.

CHEM401**Senior Thesis I (1-6-3)****CHEM402****Senior Thesis II (1-6-3)**

Prerequisite: Senior Standing, or departmental approval

Over the course of two semesters, a small team of students will work closely with a faculty member to address a significant and complex question at the boundary of knowledge in chemistry. The team will combine and apply a broad range of theoretical and practical research techniques to the question and will exercise advanced critical thinking and evaluation as the project progresses. The team will be guided through the whole research process – from hypothesis generation to data acquisition, analysis and conclusion and will be encouraged to produce professional-standard reports and presentations.

ENGL ENGLISH**ENGL111****English Communication I (4-0-4)**

Prerequisite: TOEFL iBT 79 or IELTS 6.0

This course focuses on the development of argumentative writing, with each student writing an individual formal, academic research paper. The course will also develop the skills to produce effective persuasive writing. It provides extensive practice in the use and integration of sources and also develops reading, critical thinking, and analytical skills.

ENGL112**English Communication II (4-0-4)**

Prerequisite: ENGL111

This course develops and builds on skills learned in the ENGL 111 course. Students are required to undertake a semester-long collaborative academic, educational or technical project leading to an extensive, full written report and a presentation. Students will also explore communication theories and reflect on them in writing.

ENGL220**Technical Writing and Communication (3-0-3)**

Prerequisite: ENGL 112

This course focuses on technical writing genres and style, and presentation techniques. Students will practice communicating technical information ethically for specialist, educated and general audiences using appropriate formats in order to achieve purposes such as informing, instructing and persuading. Oral presentation skills will enhance and develop techniques covered in ENGL 112, Students will be required to prepare a range of reports and other business and technical genres for print and online media.

HUMA HUMANITIES AND SOCIAL STUDIES**HUMA101****Arabic Language (3-0-3)**

Prerequisite: None

This course aims at developing the ability of students in acquiring skills and competencies in the Arabic language. For the most part, it will teach the students procedural techniques regarding the functional text structure either in Classical or in Standard Arabic. Therefore, focus will be on linking students with both their academic specialization and their Arab and Islamic environment. The ultimate objective is to develop the students' communication skills using the Arabic language.

HUMA102**Islamic Culture (3-0-3)**

Prerequisite: None

This course introduces students to Islam, giving understandings of its historical, theological and cultural components and aspects of relevance. Given the historical record of Islam, the established civilization, and the values and principles of Islam, students will also be introduced to matters of relevance to Islamic life and Islamic culture. These matters of relevance include Islamic systems and principles of organization; and, modern issues and debates, highlighting an Islamic worldview. The course will further introduce students to contemporary challenges and cultural dialogues, within the framework of modernity and from the vantage point of an Islamic perspective.

HUMA105**Emirates Society (3-0-3)**

Co-requisite: ENGL 111

This course focuses on basic knowledge related to the nature of the UAE society and its political, geographical, cultural, demographical and social aspects. It also studies the perspective view of the Emirates Society in the lighting the contemporary international changes.

HUMA106**Gulf Region Economic and Social Outlook (3-0-3)**

Co-requisite: ENGL111

The course explores the economic structure and the social conditions of the Gulf region. It focuses on the economic and social factors governing the golf communities and the impact of these factors at the regional and global levels.

HUMA110**Middle East Studies (3-0-3)**

Co-requisite: ENGL111

The course introduces the Middle East geographically, socio-culturally and historically, with a special focus on the Arab world. The course discusses the current and most important political, economic and social and cultural changes in the Middle East. The course introduces historical and current events and introduces and surveys current issues and debates surrounding the Middle East.

HUMA111**Islamic History (3-0-3)**

Co-requisite: ENGL111

The course provides a comprehensive overview of the Islamic history from the pre-Islamic to the contemporary Islamic World. The course focuses on major events that represent turning points in the history of the Islamic Nations. The course stresses the factors and reason that led to the rise and fall of Islamic regimes.

HUMA112**Sciences in Islam (3-0-3)**

Pre-requisite: ENGL111

The birth of science and innovation in the Islamic World; the contribution of scientists in different areas of science like medicine, astronomy, mathematics, how the Western civilization benefited from the Islamic civilization will be addressed.

HUMA130**Introduction to Linguistics (3-0-3)**

Prerequisite: ENGL112

An introduction to the study of language as an object in the mind, as a phenomenon in society, and as a component of computer technology. The constituents of language (morphology, phonetics, syntax) will be examined, as well as how language is learned and processed (language acquisition, psycholinguistics), the role of language in society (pragmatics, semiotics, sociolinguistics, variation, written and spoken language) and the application of computers to linguistic study (computational and corpus linguistics). The course should provide a useful grounding for students whose degree involves the analysis and application of natural or invented languages.

HUMA140**Introduction to Psychology (3-0-3)**

Pre-requisite: ENGL111

An introduction to selected concepts, methods, and vocabulary of psychology. Focus of study will be on the individual and the conditions that influence behavior. Topics that will be covered include growth and development, learning and thinking, emotions and motivations, personality and assessment, maladjustment and mental health, groups and social interaction, and social influence and society.

HUMA141**Introduction to Sociology (3-0-3)**

Pre-requisite: ENGL112

An analysis of the social and cultural forces which govern human behaviour. The principal topics include social interaction and organization,

socialization processes, primary groups including the family, collective behaviour, population and the relationship between social life and the environment.

HUMA142**Introduction to Science and Technology Studies (3-0-3)**

Prerequisite: ENGL112

This course will introduce students to major sociological and philosophical issues in the field of contemporary science and technology studies (STS). Topics to be addressed include the relationships between culture, society, scientific inquiry, and technological development. Special emphasis will be placed on the language, debates, and controversies that shape real-world applications of science and technology.

HUMA210**Introduction to Islamic Law (3-0-3)**

Prerequisite: None

This course explores classical and contemporary understandings of Islamic law, with an emphasis on Islamic legal methodology, a comparative perspective the history and development of Islamic law and its application in contemporary jurisdictions. Part of the challenge in studying Islamic law is its heterogeneity: there are several "schools" of Islamic law and there is no central religious adjudicative body. Furthermore, an overview of historical and jurisprudential themes includes the relationship between sacred texts and human reason in the development of the law, dissent, and consensus in the articulation of the law, law and morality and normative pluralism. A detailed examination is made of the various applications of Islamic family law, with a regional focus on countries of the Middle East and South Asia. The initial inquiry will examine what exactly, Islamic law is. The course will begin with an analysis of the major schools of Islamic law and will then move to classical and contemporary understandings of how differences are resolved in Islamic law.

HUMA211**Islam and Modernity (3-0-3)**

Prerequisite: ENGL112

The study of the encounter between Islam and modernity, since the early nineteenth century when the Muslim world came face to face with a powerful West, until the present time. The focus will be on the intellectual and political components of modernity and their impact on Muslim culture and society.

HUMA212**History of Modern Science (3-0-3)**

Prerequisite: ENGL112

This course offers a survey of the history of science from the beginnings of the Copernican Revolution in the Sixteenth Century to the beginnings of aviation and the origins of the Nuclear Age in the early Twentieth Century (1543-1904). Developments and innovation in science will be considered in relation to the biographies, and historical and social and cultural contexts of the key figures in the history of modern science.

HUMA220**Public Speaking (3-0-3)**

Prerequisite: ENGL112

This course helps students to develop poise and confidence when doing speeches in front of an audience. Students will learn speaking and listening skills while learning the psychology of public speaking and how to improve their own public speaking abilities. They will both prepare their own speeches to present before an audience as well as observe and evaluate others speeches.

HUMA295**Special Topics in Humanities and Social Sciences (3-0-3)**

Prerequisite: Topic specific

This course mainly deals with various trends in Humanities and Social Sciences. Course is repeatable if title and content differ.

HUMA296**Directed Study (1 to 3 credits)**

Prerequisite: Approval of Academic Advisor and Department Chair.

Directed study gives students the opportunity to explore an area of interest without having extensive knowledge or experience in the subject area or field of study. As a result, faculty direction and guidance are critical. A formal written report is usually required.

HUMA311**Engineering Communication (3-0-3)**

Prerequisite: ENGL112; Junior standing

This Engineering Communication course is designed to practice specific detailed written and oral communications used in Engineering. The course covers written documents and oral communication produced in response to the context of the Engineering curriculum and/or issues related to it. Students will work on realistic contextualized tasks with the aim of developing communication strategies necessary to meet the academic and entry-level professional requirements in Engineering.

HUMA395**Islam and the Discourse of the Enlightenment (3-0-3)**

Prerequisite: HUMA211

This course is devoted to a sustained exploration of the encounter between Islam and the Enlightenment with a focus on the philosophical and intellectual sphere. It seeks to study the ways in which contemporary Muslim intellectuals engaged with different aspects of the epochal phenomenon of the Enlightenment and the likely outcome of such an encounter for the Arab-Muslim world. The course utilizes modern methodologies in hermeneutics and discourse analysis.

JAPN JAPANESE**JAPN101****Elementary Japanese (3-0-3)**

Prerequisite: None

This course is designed for those who have no prior knowledge of Japanese. Students will become familiar with Japan's language and culture through short passages or dialogues related to standard situations encountered in Japan, using audio-visual material. The course does not only teach basic language skills but also builds up vocabulary, an understanding of grammar and basic sentence structures as a foundation for oral comprehension and teaches Hiragana, Katakana. The attention paid to each of the four basic language skills, listening, speaking, reading, and writing, is carefully attuned to the goal of creating a balanced competence profile.

JAPN102**Elementary Japanese II (3-0-3)**

Prerequisite: JAPN101 or Placement Exam

The course is a continuation of JAPN 101 and continues to build up the four basic language skills. Apart from building vocabulary and reinforcing grammatical concepts acquired in JAPN 101, communication skills will take center stage. While listening and speaking are thus at the center of the curriculum, the course will also contain rigorous materials related to central grammatical properties of contemporary Japanese.

KORA KOREAN**KORA101****Elementary Korean I (3-0-3)**

Prerequisite: None

This course is designed for those who have no prior knowledge of Korean. Students will study the language's orthography, phonetics, grammar, and vocabulary. It provides complete beginners of Korean with a solid foundation in all four language skills: reading, writing, speaking and listening. The course introduces simple communication in most essential daily life situations such as greetings, self-introduction, weather, shopping, time and appointments, past activities, and future plans.

KORA102**Elementary Korean II (3-0-3)**

Prerequisite: KORA101 or placement exam

Continuation of KORA 101 (Elementary Korean I). This course is designed for students who have a basic knowledge of the Korean language. It provides a foundation that will enable students to improve and acquire language skills in listening, speaking, reading and writing. In addition, students will develop communication skills for routine tasks and situations.

MATH MATHEMATICS**MATH111****Calculus I (3-1-4)**

Prerequisite: MATH002 or placement test

This course will introduce students to the theory and techniques of single variable differential and integral calculus. The emphasis is on problem solving in a science and engineering context, as opposed to theory. Topics include studying the exponential, logarithmic, trigonometric, and polynomial functions and their limits, continuity, derivatives, extrema, integration, area under a curve, and volumes of revolution.

MATH112**Calculus II (4-0-4)**

Prerequisite: MATH111 (C grade or higher)

This is a second semester calculus course for students who have previously been introduced to the basic ideas of differential and integral calculus. The emphasis in this course is on problem solving, rather than theory. Topics include integration techniques, parametric equations, infinite series, and an introduction to vectors and vector-valued functions, with an excursion into cylindrical and spherical coordinates.

MATH204**Linear Algebra (3-0-3)**

Prerequisite: MATH112

This is an introductory course in Linear Algebra. Topics covered in this course include basic properties of matrices and determinants, solving a linear system of equations, vector spaces, subspaces, linear independence, span, basis, coordinates, linear transformations, matrix representations of linear transformations, eigenvalues and eigenvectors, diagonalization, Euclidean inner product, and orthogonality.

MATH206**Differential Equations (3-0-3)**

Prerequisite: MATH112

This is a first course in ordinary differential equations at the undergraduate level. The contents include Euler's method, first-order and second-order differential equations, series solutions, and the Laplace transform. Solution techniques are applied to engineering and science problems.

MATH214**Mathematical and Statistical Software (3-0-3)**

Prerequisites: ENGR113; MATH204; MATH243

This course provides students with an introduction to the two major software packages used in the Applied Mathematics and Statistics program and its concentrations. Students will receive significant hands-on training in the use of MATLAB for mathematical applications and R for statistical applications.

MATH231**Calculus III (3-0-3)**

Prerequisite: MATH112

This course covers differential and integral calculus in several variables. Topics include partial derivatives, gradient, divergence, curl, Lagrange multipliers, multiple integrals, line integrals, vector fields, Green's theorem, Stokes' theorem, and Gauss's theorem.

MATH232**Electrical Engineering Mathematics (3-0-3)**

Prerequisite: MATH112

This course covers mathematical topics more suitable for second year electrical engineering students. Topics include complex numbers, partial derivatives, gradient vectors, multiple integrals, and Fourier series.

MATH234**Discrete Mathematics (3-0-3)**

Prerequisite: MATH112

Propositional and predicate calculus, mathematical reasoning including mathematical induction, and introduction to sets, basic number theory, functions, relations, graphs, trees, cardinality, and counting techniques. Solving first and second order linear recurrence relations.

MATH242**Introduction to Probability and Statistics (3-0-3)**

Prerequisite: MATH112

This course introduces students to basic probability models and statistical methods for data analysis. The course will cover introductory probability theory, discrete and continuous probability distributions, elements of descriptive statistics, and different statistical inference methods such as estimation for the mean and the variance, hypothesis testing for the mean and the variance.

MATH243**Probability and Statistical Inference (3-0-3)**

Prerequisite: MATH112

Co-requisite: MATH204

This course provides a mathematically rigorous introduction to Probability Theory and Inferential Statistics. Numerous real-world applications are presented throughout the course. After covering random variables/vectors, expectation/variance, and limit theorems, students are introduced to inferential statistics, including asymptotic confidence intervals in the presence of nuisance parameters. The course ends with a thorough introduction to random walks, an essential probability model in engineering.

MATH314**Real Analysis and Probability (4-0-4)**

Prerequisites: MATH204; MATH231; MATH243

This course provides students with an introduction to the fundamental concepts and theory which underpin many of the applied mathematics and statistics courses that follow in the Applied Mathematics and Statistics Program.

MATH315**Advanced Linear Algebra (3-0-3)**

Prerequisite: MATH204

Survey of the mathematical structure of vector spaces and linear transformations within a scientific and engineering context. Topics include vector spaces, matrices, linear mappings, scalar products and orthogonality; symmetric, Hermitian, and unitary operators, eigenvalues and eigenvector theorems, diagonalization and the spectral theorem; applications including convex sets, separating hyper-planes, Krien-Milman theorem.

MATH316**Partial Differential Equations (3-0-3)**

Prerequisite: MATH314

The course introduces the modern theory of partial differential equations in both classical and variational formulations. Students will have the opportunity to study some of the following topics: Series solutions of ODEs, Legendre's and Bessel's ODEs, PDEs and their classifications, Well-posedness, Green's functions and integral representations, Nonlinear PDEs, Sobolev spaces and related Theorems, Variational formulation of PDEs, Weak solutions, and the Lax-Milgram formulation.

MATH317**Nonparametric Statistics (3-0-3)**

Prerequisites: MATH214; MATH314

The course provides an overview of modern nonparametric statistics and aims at familiarizing students with a wide range of ideas in this field. A combination of theoretical results and computational techniques will be presented

with the clear goal of developing a thorough understanding of a number of useful methods for analyzing data.

MATH318**Multivariate Statistics (3-0-3)**

Prerequisites: MATH204; MATH231; MATH214

This course provides a thorough introduction to multivariate statistical analysis methods. Particular emphasis will be placed on methods for analyzing categorical data. All methods will be illustrated with real data sets using the open-source software R.

MATH319**Numerical Analysis I (3-0-3)**

Prerequisites: MATH204; MATH206; MATH214

A survey of numerical methods for scientific and engineering problems. Topics include numerical solution of linear and nonlinear algebraic equations, interpolation and least squares approximation, numerical integration and differentiation, eigenvalue problems, and an introduction to the numerical solution of ordinary differential equations. Emphasis is placed on efficient computational procedures including the use of library and student-written procedures using MATLAB.

MATH333**Applied Engineering Mathematics (2-3-3)**

Prerequisites: ENGR112; MATH204, MATH206

This course provides students with the numerical and analytical methods to solve mathematical models appearing in engineering science including, but not limited to, nonlinear equations, systems of algebraic equations, extrapolation, and ordinary differential equations. Applications will include wave motion and heat conduction. The course includes writing computer codes.

MATH352**Elementary Theory and Application of Functions of a Complex Variable (3-0-3)**

Prerequisites: MATH204; MATH206

This course provides students with a sound knowledge of analytic functions of a complex variable, infinite series in the complex plane, theory of residues which includes Laplace inversion integral and stability criteria, and conformal mapping. After this course, students will be able to carry on their own work effectively and keep abreast of current developments in their fields.

MATH399**Internship (0-0-1)**

Prerequisite: Junior standing and approval of department

Students are required to spend a minimum of eight continuous weeks on an approved internship program. The internship provides students with practical, on-the-job experience which allows them to integrate theory with "real world" situations. It is academically supervised by a faculty member and professionally supervised by the company's internship supervisor who provides feedback to the University about the student's progress. A formal report, that documents the work undertaken during the internship period, must be submitted to the Department within the first two weeks of the semester following the internship. The report and the complete course activities are graded on a Pass/Fail basis by a faculty member.

MATH411**Modern Algebra (3-0-3)**

Prerequisite: MATH315

This course provides students with a survey of properties of fundamental elements of modern algebra such as groups, rings, and fields and their applications to engineering. Topics include sets and functions, fundamental theorems of groups, rings, and fields; homomorphism theorems; Galois theory; applications to number theory and encryption, coding theory, and error correcting codes.

MATH412**Optimization (3-0-3)**

Prerequisites: MATH317; MATH318

This course introduces the principal methods and algorithms for linear, nonlinear, and multi-objective optimization. Emphasis is on methodology and the underlying mathematical structures. Topics include the simplex method, convex optimization, optimality conditions for nonlinear optimization, interior point methods for convex optimization, Newton's method, duality theory, Lagrange multiplier theory, multi-objective decision making, goal programming, stochastic optimization, fuzzy optimization, and applications in finance and management.

MATH413**Game Theory (3-0-3)**

Prerequisite: MATH315

Introduction to the mathematical theory of games and game theoretic analysis. Topics include combinatorial and strategic games, Zermelo's algorithm, strictly competitive games, minimax theorem; non-cooperative games and Nash equilibrium; games with mediated communication, repeated games, and finite automata; common knowledge and incomplete information; applications in economics, biology, and political science.

MATH414**Discrete Mathematics (3-0-3)**

Prerequisite: MATH315

Review of propositional and predicate calculus. Introduction to naïve set theory. Relations including equivalence relation and partial order. Cardinality including surjective and injective functions. Recursion and induction including well order. Boolean algebras, Knot Theory, and Graph Theory.

MATH415**Design of Experiments (3-0-3)**

Prerequisites: MATH317; MATH318

A review of simple designs and analysis of variance, followed by an introduction to block designs, Latin Squares and Related Designs,

Full Factorial Designs, 2-level Full Factorial and Fractional Factorial Designs, Response surface methods and designs, Designs with Random Factors, Nested Designs, and split-plot Designs.

MATH416**Sample Survey Design and Analysis**

Prerequisite: MATH214

This course will focus on methodological issues regarding the design, implementation, analysis, and interpretation of surveys and questionnaires in variety of applied areas such as education, healthcare, social sciences, etc.

MATH419**Numerical Analysis II (3-0-3)**

Prerequisite: MATH319

Introduction to the theory and practical methods for numerical solution of differential equations. Runge-Kutta and multistep methods, stability theory, stiff equations, boundary value problems. Finite element methods for boundary value problems in higher dimensions. Direct and iterative linear solvers. Discontinuous Galerkin methods for conservation laws.

MATH421**Econometrics (3-0-3)**

Prerequisite: MATH317; MATH318

Fundamentals of statistical time series analysis and econometrics are presented and developed for models used in the modern analysis of financial data. Techniques are motivated by examples and developed in the context of financial applications.

MATH422**Stochastic Differential Equations (3-0-3)**

Prerequisite: MATH314

Stochastic Differential Equations are used extensively in economics and finance. Reflecting this, this course provides an introduction to stochastic differential equations emphasizing applications and computations. It considers strategies for exact, approximate, and numerical solutions of SDEs, and emphasizes the relationship with partial differential equations.

MATH423**Financial Risk Analysis (3-0-3)**

Prerequisite: MATH412

This course aims to provide an overview of the main theoretical concepts underlying the analysis of financial risk and to show how these concepts can be implemented in practice in a variety of financial contexts. Additionally, students will learn how to examine and manage risk and its impact on decisions and the potential outcomes.

MATH424**Optimal Control Theory (3-0-3)**

Prerequisite: MATH412

This course aims to provide an overview of deterministic and stochastic control theory in both discrete and continuous time. We will apply the theory to relevant problems in finance and economics.

MATH425**Financial Portfolio Management (3-0-3)**

Prerequisite: MATH412

This course concerns making sound financial decisions in an uncertain world. Increasingly, financial decision-makers are depending on optimization techniques to guide them in their decisions. Topics to be covered will include asset/liability management, option pricing and hedging, risk management, and portfolio selection. Optimization techniques to be covered will include linear and nonlinear programming, integer programming, dynamic programming, and stochastic programming.

MATH431**Computational Methods in Biology (3-0-3)**

Prerequisite: BMED211

Co-requisite: MATH419

This course presents an overview of important applications of computers to solve problems in biology. Major topics covered are computational molecular biology, modeling, and simulation including computer models of population dynamics, biochemical kinetics, cell pathways, neuron behavior, and mutation and development of models of physiological systems using the compartmental framework. The final part of the course introduces techniques to analyze and interpret the "classical" models of theoretical ecology.

MATH432**Mathematical Models in Biology (3-0-3)**

Prerequisites: MATH316; MATH419; BMED211

This course provides an introduction to the application of differential equations (ODEs and PDEs) to develop mathematical models of real-world phenomena in the biological sciences. Topics will include drug infusion, epidemics, chemical kinetics and enzymatic reactions, population growth and oxygen diffusion in muscles.

MATH433**Biostatistics (3-0-3)**

Prerequisites: MATH318; BMED211

This course provides an introduction to Biostatistics. In particular, methods and concepts of statistical analysis and sampling in the biological sciences are presented. A thorough coverage of Sequential Analysis methods and Survival Analysis methods, and their applications in biology are included.

MATH434**Bioinformatics (3-0-3)**

Prerequisites: MATH433; BMED202

Principles of protein structure, techniques within the framework of basic shell scripting and web-based bioinformatics databases/tools, principles of sequence alignment, automation/use of existing applications for the analysis of large datasets.

MATH435**Mathematical Imaging (3-0-3)**

Prerequisite: MATH412

Mathematical Imaging provides a comprehensive treatment of the mathematical techniques used in imaging science. Students will become familiar with concepts such as image formation, image representation, image enhancement, noise, blur, image degradation, edge detection, filtering, denoising, morphology, image transforms, image restoration, image segmentation, image quality measure, fractal image coding, with applications to Bio-imaging and Medical Imaging.

MATH450**Senior Project I (3-0-3)**

Prerequisite: Successful completion of the first six semesters of the program

This is a two semester course in which students will conduct a research project under the close supervision of one faculty member. Typically, this will be an individual research experience for the student although small group projects, consisting of no more than two student members, may be considered in exceptional circumstances. Students will present the results of their research in the form of a written thesis and an oral presentation to faculty and students.

MATH451**Senior Project II (3-0-3)**

Prerequisite: MATH450

A continuation of MATH450.

**PGEG PETROLEUM
GEOSCIENCES****PGEG210****Earth Materials (2-3-3)**

Prerequisites: PGEG221; CHEM116

This course introduces the fundamentals of mineralogy, including systematic chemistry and crystallography and physical and optical properties of minerals, emphasizing the carbonate group and silicate minerals. Students learn to use the petrographic microscope and to describe and identify a variety of rock-forming minerals in hand samples and petrographic thin-sections.

PGEG220**Geology of the Middle East (3-0-3)**

Prerequisite: PGEG221

This course covers application of the principles of stratigraphy and age dating methods, first introduced in Introduction to Geology and Geophysics. The course introduces biologic evolution theory and covers the evolution of Earth's atmosphere and biosphere. The emphasis of the course is on the tectonic, stratigraphic, and geographic evolution of the Middle East, and particularly on paleo-environments, facies, and tectonic setting of UAE reservoir intervals. The principles of basin analysis, including the formation of organic-rich rocks and maturation of hydrocarbons, are introduced.

PGEG221**Introduction to Geology and Geophysics (2-3-3)**

Prerequisite: Freshman standing

An introduction to geology and geophysics, emphasizing the processes that form and shape Earth, petroleum geology and geophysics, and the geology of the UAE and the Middle East. Course topics include origin of minerals and rocks; seismology; Earth's gravity; geomagnetism; geologic time; plate tectonics; structural geology; sedimentary transport and the depositional environments of reservoirs; geo-hazards; hydrology; economic geology. The course includes at least one all-day field trip.

PGEG230**Geological Maps (2-3-3)**

Prerequisite: PGEG221

An ability to read, interpret and apply geological and topographic maps to the Earth System is fundamental to the Earth Sciences. The accurate collection, recording, and interpretation of high-quality fieldwork data is essential to a geologist's understanding of Earth processes and environments. Through the application of practical exercises, students will learn to apply static two-dimensional representations in order to construct and understand three-dimensional subsurface geometries. Students will learn to employ the primary data-gathering techniques used by geologists in the field and the reasons for these.

PGEG300**Matlab for Earth Scientists (2-3-3)**

Prerequisites: ENGR113; MATH231

The course will introduce algorithms to numerically solve mathematical problems relevant to earth sciences problems with a focus on numerical methods programming using Matlab. First, the course will cover the basics of Matlab operating environment and language for computing and plotting. It will be followed by solving nonlinear algebraic equations, systems of linear equations, linear curve fitting, polynomial curve fitting, finite differences, numerical integration and differentiation and finally basic applications to earth sciences problems.

PGEG311**Sedimentary Petrology (3-3-4)**

Prerequisite: PGEG221

Sedimentary Petrology is concerned with the origin of sediment and sedimentary rock. The course covers sedimentary processes, facies, and diagenesis. Emphasis is on petrographic analysis of microfacies and diagenesis and on carbonate reservoirs and source rocks. Students learn how to characterize reservoirs using limited subsurface information from petrographic thin sections and cores. For PGEG students the course includes a compulsory four-day field trip; PEEG students are required instead to complete a core-logging laboratory project.

PGEG312**Reflection Seismology (3-3-4)**

Prerequisites: PGEG221; PHYS122; MATH231

This course covers the fundamental wave theory that is the basis for the method, and the seismic data acquisition, processing, and display techniques in such a way that one can map the underground and describe its characteristics. The course has a significant theoretical component and includes class exercises using seismic software and display systems on real-world seismic data. A major component of the course is to design, acquire data, and interpret a seismic reflection survey. The course requires fieldwork.

PGEG321**Structural Geology (3-3-4)**

Prerequisites: PHYS121; PGEG221; PGEG230

Structural geology is the study of deformed rock. The course deals with the range of structures produced in rock by deformation; with the role of structures in trapping petroleum and their effect on production and with application of structural methods in E and P. Course topics include stress and strain; rheological behavior of rock; effects of time, temperature, and pressure on deformation; kinematic and dynamic analysis of deformed rock; the origin and mechanisms of fractures, faults, and folds; structural interpretation from seismic reflection, well, and other E&P data; mapping of subsurface structures from industry data; regional structural geology of the UAE. The course includes one three-day field trip.

PGEG323**Remote Sensing for Earth Sciences Applications & GIS (1-3-2)**

Prerequisites: ENGR101, MATH 231, PHYS 122

The course covers the basic principles and essential skills of remote sensing using image visualization, processing, and geographical information systems (GIS) for geological and/or environmental mapping. Students will learn the basic skills of image visualization, processing, interpretation and data manipulation for mapping. The course emphasizes the use of satellite images as essential information source for fieldwork. After completing the course, students should understand the physical principles of remote sensing and be familiar with the major remote sensing satellites and datasets.

PGEG331**Igneous and Metamorphic Petrology (2-3-3)**

Prerequisite: PGEG210

An overview of igneous and metamorphic rocks as a background for discussing their origin and distribution in relation to plate tectonics. Course topics include rocks and Earth structure, structures, textures, chemistry, and mineralogy of igneous rocks; phase rule and phase diagrams; origin and movement of magmas; metamorphism

and metamorphic rock texture, structures and mineralogy, metamorphic facies and metamorphic phase diagrams.

PGEG341**Paleontology (2-3-3)**

Prerequisite: PGEG220

Paleontology is the study of past life. The course covers the application of taxonomic procedures to the identification of fossils and the application of paleontology in paleo-environmental and bio-stratigraphic analysis. Students learn about the fundamental morphology, modes of life, evolutionary trends, and time ranges of major macrofossil and microfossil groups. Emphasis is on fossil types that are important in the analysis and interpretation of petroleum reservoirs of the Middle East. The course includes at least one all-day field trip.

PGEG351**Applied Geophysics (3-3-4)**

Prerequisites: PGEG221; PHYS122

The course provides an introduction to the principles and methods involved in modern geophysical petroleum exploration. The course concentrates on physical principles survey techniques and interpretation of gravity, magnetics, electrical, and electromagnetics techniques. Students will learn about the equipment used, typical fieldwork design, numerical data corrections, and data processing for each survey method. The course includes at least 3 all-day field trips.

PGEG361**Sedimentology and Stratigraphy (2-3-3)**

Prerequisites: PGEG220; PGEG311

Stratigraphy instructs in the sedimentological and stratigraphic methods used to analyze and interpret sedimentary sequences. Students will learn to interpret physical processes and depositional environments from sedimentary structures and textures and to apply sequence stratigraphic methods to interpret and model facies and sedimentary basin evolution. The course incorporates modern and ancient examples from the Middle East, particularly from the UAE. The course includes five days of fieldwork.

PGEG371**Data Analysis and Geostatistics (3-3-4)**

Prerequisites: PGEG221; MATH231

This course introduces the conceptual basics of statistical analysis of geoscience data and instructs students in how to apply statistical methods including geostatistics to interpret geoscience data and to solve petroleum geoscience problems. Course topics include graphical representations, univariate statistics, probability, normal distributions, statistical inference, analysis of variance, bivariate correlation, and regression analysis, directional data, circular statistics, Markov analysis, event series and time series analysis, analysis of spatially distributed data, trend surface analysis, kriging, and multivariate methods.

PGEG381**Rock Mechanics and Reservoirs (2-3-3)**

Prerequisite: PGEG321

This course builds on material introduced in PGEG 321 and provides theoretical and practical introduction to basic physical and mechanical rock properties and their core-based measurements. Selected reservoir rock properties such as porosity, permeability, saturations, capillary pressures and relative permeability are introduced first. Then topics such as nature of rock, rock deformability, brittle and ductile behavior, rock stresses, stress transformations, rock strength and failure and rock testing methods are discussed. Concepts introduced in the classroom are reinforced through laboratory sessions.

PGEG397**Field Petroleum Geology (0-0-4)**

Prerequisites: PGEG321; PGEG361

Field Petroleum Geology is concerned with the study of lithologies and structures in the field. The course addresses vertical and horizontal variability in depositional facies and physical characteristics in reservoirs in three dimensions and shows how physical variability affects petroleum capacity, flow, and production. Attention is paid to post-depositional diagenetic processes and their effect on reservoir evolution. Students make geological and petrophysical measurement of time and

facies-equivalents to UAE carbonate reservoirs. The course includes two periods of two weeks of fieldwork, each followed by one week of data integration and report writing at the Petroleum Institute.

PGEG398**Geophysics Internship (1-0-1)**

Prerequisites: PGEG312; PGEG351; PGEG361

Students are assigned to a variety of ADNOC's operating companies or geophysical service companies where they will work on short-duration projects allowing them to apply the acquire knowledge, gain practical experience and become acquainted with the industry's working environment. Each student is required to submit a written report and deliver a presentation on his/her work assignment.

PGEG400**Seismic Data Acquisition and Processing (2-3-3)**

Prerequisites: MATH206; PGEG300; PGEG312

This course provides an introduction to 2D and 3D seismic data acquisition and processing for land and marine surveys. It will introduce an overview of seismic data acquisition for both land and marine environments. However, the course will concentrate on processing reflection seismic data to produce a geologically interpretable seismic volume. This will be achieved through a comprehensive seismic data processing stream that will take the seismic data from the field to the final migrated volume. An introduction to advanced and modern techniques of seismic data processing to further enhance the seismic image will be covered.

PGEG401**Petrophysics and Logging (3-3-4)**

Prerequisites: PGEG361; PGEG371

The course presents the physical principles of well logging. PGEG 401 introduces students to geophysical measurements made under borehole and lab conditions. The course also demonstrates methods to correlate geophysical measurements and rock properties and prepares students to perform basic well log and core data interpretation. The course covers concepts of rock properties and their application in the oil industry; lab measurements of rock properties (porosity, permeability, density, resistivity, fluid saturation); lithology logs, porosity logs, fluid saturation and permeability estimation from well logs; and full well log interpretation. The course refers to rock mechanics from core and well log data.

PGEG410**Reservoir Geophysics (2-3-3)**

Prerequisites: PGEG351; PGEG400; PGEG401

The course provides an introduction to reservoir geophysics with emphasis on carbonate reservoirs. The course concentrates on the integration of seismic data, well data, and petrophysical data. Various aspects of the traditional approach of exploration geophysics, as well as modern aspects of reservoir geophysics, will be covered.

PGEG412**Seismic Reflection Interpretation (3-3-4)**

Prerequisite: PGEG312

Co-requisite: PGEG461

The course covers principles and practices of seismic reflection interpretation. Course topics include seismic interpretation theory and principles; picking wavelets; well to seismic ties; synthetic seismograms; fault identification; time-to-depth conversion; seismic stratigraphy; 3D seismic interpretation; seismic fracture analysis and interpretation; and seismic attributes. Students will learn how to interpret varieties of processed seismic data using seismic data interpretation software. Emphasis is on interpretation of carbonate strata.

PGEG 413**Micropaleontology (2-3-3)**

Prerequisite: PGEG341

Micropaleontology is the study of microscopic fossil organisms. This course offers an overview of the most common microfossil groups. Identification techniques, stratigraphic distribution of the major microfossil groups and their relation with the sedimentary environments will be explained. The applications and uses of each microfossil group (biostratigraphy, paleogeography, paleoenvironmental, paleoclimatic reconstructions) will be explained. Emphasis will be on shallow-marine unicellular microorganisms of the Mesozoic and Cenozoic.

PGEG451**Environmental Geology (3-0-3)**

Prerequisites: PGEG221; CHEM116

This course deals with how people interact with Earth's natural systems. Environment profoundly controls social and economic systems but, simultaneously, humans are major agents of geologic change. The course covers natural hazards, landscape and soil characteristics, groundwater, surface water, climate change, and ethics of environmental issues, emphasizing the environment and environmental issues of the UAE. The course includes a one-day field trip.

PGEG461**Reservoir Characterization Project (2-6-4)**

Prerequisite: PGEG361

Co-requisite: PGEG412

The course introduces and applies the principles and practices used to characterize petroleum reservoirs using core, structural, seismic, petrographic, and petrophysical data. Emphasis is on depositional geometries, petrophysical properties, and compartmentalization of carbonate reservoirs. Much of the coursework involves characterizing and designing a model of a UAE reservoir integrating multiple datasets.

PGEG490**Senior Research Project I (1-2-3)**

Prerequisite: Senior Standing

This course comprises the development and initiation of an independent research project within the fields of the Earth Sciences. Prior to commencing the course, students must arrange for supervision from a Geosciences member of faculty and the topic of study must be approved by the Geosciences Program. The course comprises a significant taught component focusing on the methodologies and ethics of project proposal preparation. Following the preparation of the acceptance of the written proposal and the successful defence of the proposal presentation, the student will commence work on the project.

PGEG491**Senior Research Project II (1-6-3)**

Prerequisite: PGEG490

This course involves completion of a project in the student's area of interest in some area of petroleum geology or geophysics. Students must have arranged for supervision from an instructor and the project must have been approved by the Petroleum Geosciences Program. The course consists mostly of independent project work.

PGEG 293/393/493**Special Topics in Petroleum Geosciences (1-4 credit hours, variable dependent on credit hours)**

Prerequisites: To be determined by the program

Co-requisites: To be determined by the program

Restrictions: PGEG 293 is open to Sophomore students and above, PGEG 393 is open to Junior students and above, PGEG 493 is open to Senior students only

The course offers content not included in existing courses. A student can take multiple Special Topics courses with different content for credit subject to program approval.

PGEG 394/494**Research Topics in Petroleum Geosciences (1-4 credit hours, variable dependent on credit hours)**

Prerequisites: To be determined by the program

Co-requisites: To be determined by the program

Restrictions: PGEG 394 is open to Junior students and above, PGEG 494 is open to Senior students only

The course focuses on research-driven topics. A student can take multiple Research Topics courses with different content for credit subject to program approval.

PGEG 396/496**Independent Study in Petroleum Geosciences (1-4 credit hours, dependent on credit hours)**

Prerequisites: To be determined by the program

Co-requisites: To be determined by the program

Restrictions: CGPA \geq 3.0, PGEG 396 is open to Junior students and above, PGEG 496 is open to Senior students only

The course may offer content not included in existing courses in an independent study format based on a formal arrangement between the student and instructor. A student can take one or more Independent Study courses (up to 6 credits). Independent Study courses require prior approval of the Program Chair and Provost (or designee).

PHYS PHYSICS**PHYS121****University Physics I (3-2-1-4)**

Prerequisite: MATH111

This course gives a vector-based and calculus-based introduction to fundamental concepts in Newtonian mechanics, mechanical conservation laws, oscillations, and waves. The course includes laboratory/studio activities with experiments that cover the concepts discussed in the lectures.

PHYS122**University Physics II (3-2-1-4)**

Prerequisites: PHYS121; MATH112

This course uses basic vector calculus and techniques of integration to determine the spatial and temporal distribution of charges, currents and electromagnetic fields. Basic elements of electricity and material properties and basic elements of electric circuits are also introduced. Electromagnetic waves and applications to physical optics are discussed. The course includes laboratory/studio activities, with experiments that cover the concepts discussed in the lectures.

PHYS295**Introduction to Quantum Mechanics for Scientists and Engineers (3-0-3)**

Prerequisites: MATH204; MATH206; PHYS122

This course is designed to give undergraduate students in engineering and science an introductory background in modern physics and elementary quantum mechanics. The first part of the course will consider topics in modern physics that led to the development of quantum mechanics. The second part of the course will be devoted to introductory wave mechanics and quantum mechanics.

COLLEGE OF ENGINEERING COURSES**AERO AEROSPACE ENGINEERING****AERO 200****Statics (3-0-3)**

*(Cross listed with CIVE 200; MEEN 200)

Prerequisite: PHYS 121

A vector treatment of force systems and their resultants: equilibrium of trusses, beams, frames, and machines, including internal forces and three-dimensional configurations, static friction, properties of areas, and distributed loads and hydrostatics.

AERO 201**Engineering Dynamics (3-0-3)**

*(Cross listed with CIVE 201; MEEN 201)

Prerequisite: AERO 200

Co-requisites: MATH 204; MATH 206

This course introduces rectilinear and curvilinear motion of particles and rigid bodies, kinematics and kinetics of particles and rigid bodies, rotational and translational motion of rigid bodies, principle of work and energy, and principle of impulse and momentum in particles and rigid body dynamics.

AERO 215**Introduction to Aerospace Engineering (2-3-3)**

Prerequisite: ENGR 111

Co-requisite: AERO 200

Introduction to the field of aerospace engineering, basic aerospace systems and disciplines, and a working vocabulary of the field; demonstration of conceptual design through examples.

AERO 220**Aerospace Materials (3-0-3)**

Prerequisite: PHYS 121

Materials (metals, alloys, polymers) in engineering service; relationship of inter-atomic bonding, crystal structure and defect structure (vacancies, dislocations) to material properties; polymers, ceramics, composites, phase diagrams and alloys; microstructure control (heat treatment) and mechanical properties; material failure; corrosion.

AERO 225**Mechanics of Solids (3-3-4)**

*(Cross listed with MEEN 325)

Prerequisite: AERO 200

The course is an introduction to the mechanics of deformable solids applied to basic engineering structures. It covers the concepts of stress and strain at a point; deformation of axial members; symmetric and unsymmetric bending of elastic and elastic-perfectly plastic beams; torsion of open and closed section; beam deflection; stress and strain transformations, and elastic buckling of columns.

AERO 240**Thermodynamics (3-2-4)**

Prerequisite: PHYS 121

Introduction to the concept of energy and the laws governing the transfers and transformations of energy. Emphasis on thermodynamic properties of pure substance, the first law analysis of closed and open systems, the concept of entropy, and the second law of thermodynamics. Integration of these concepts into the analysis of basic power and refrigeration cycles.

AERO 321**Aerospace Structures (3-0-3)**

Prerequisite: AERO 225

Basic concept of the design/failure criteria for aerospace structures, advanced strength of materials analysis of elastic structures, materials selection, structural assemblies, vibration and bending of plates and beams and analysis of aircraft skin structures.

AERO 335**Aerodynamics I (3-3-4)**

Prerequisites: MATH 231; AERO 215

Introduction to aerodynamics; conservation equations (integral and differential forms) for mass, momentum, and energy; potential flow; irrotational versus rotational flow; airfoil and wing analysis; boundary layers on plates and airfoils.

AERO 336**Aerodynamics II (3-0-3)**

Prerequisites: AERO 240; AERO 335

Introduction to compressible flows. Compressibility effects on airfoil and wing aerodynamics. Normal Shock Waves. Oblique Shock and Expansion Waves. Compressible Flow through Nozzles, Diffusers, and Wind Tunnels. Subsonic Compressible Flow over Airfoils: Linear Theory, Linearized Supersonic Flow. Elements of Hypersonic Flow.

AERO 350**Dynamic Systems and Control (3-3-4)**

Prerequisites: MATH 204; MATH 206; AERO 201, PHYS 122

Mathematical modeling of mechanical, electrical, and non-engineering systems; basic concepts in dynamic systems analysis – equilibrium, stability, linearization; mechanical vibrations: free and forced vibration of single degree of freedom systems, transient and steady state response, resonance, free vibration of two degree of freedom systems; control systems: basics of feedback control, transfer functions and block diagrams, design specifications based on step response, PID control, employing Matlab in modeling and response analysis of dynamical systems, applications.

AERO 391**Independent Study I (Variable course credits from 1 to 3)**

Prerequisite: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

AERO 401
UAV Modeling and Control (3-0-3)

Prerequisites: MEEN 300 or (AERO/MEEN 201 & AERO 350/MEEN 356)

The course covers the theory and practice of the modeling and control of UAV systems. The key topics of this course include: the first-principles modeling and simulation of fixed-wing and rotorcraft UAVs, flight dynamics modeling via system identification, on-board flight control system design, and control performance tuning of the auto-pilot system.

AERO 402
UAV Sensing (3-0-3)

Prerequisite: ECCE 300 or (ECCE 302 & (ECCE 356 or ECCE 370))

Note: Students can take ECCE 356 or ECCE 370 as a co-requisite instead of prerequisite.

The course contents the following topics: Inertial Sensor Based Navigation, Satellite Positioning (GPS, GLONASS) Based Navigation, Computer Vision, Image Processing, Object Matching, Object Localization and Image Based Tracking Lidar and Radar based 3D Mapping and Sensing.

AERO 403
UAV Navigation (3-0-3)

Prerequisite: AERO 401; AERO 402

In this course, students will study navigation systems for UAVs including: Trajectory Planning, Path Planning and Obstacle Avoidance (classical and reactive paradigms), Localization and Mapping, SLAM, Visual SLAM.

AERO 404
UAV Systems (2-3-3)

Prerequisites: AERO 401, AERO 402
 Co-requisite: AERO 403

This is a practical course where the students will design, construct and test their own UAV systems. The key topics of this course include: platform design and construction, actuator and propulsion system design, sensing system design (based on inertial sensors, positioning system, vision, and etc.), auto-pilot system design and performance

tuning, ground control station development (data links, protocols, security, and etc.), and UAV operation and interfacing.

AERO 415
Aerospace Materials Manufacturing (3-0-3)

Prerequisites: AERO 225; AERO 220

Aerospace materials and manufacturing; properties and processing of polymers, composites and metal alloys. Analysis of selected manufacturing processes including injection molding, extrusion, liquid composites molding, autoclave, out of autoclave, and metal manufacturing processes. Discussions will be presented on important material properties that influence different manufacturing processes.

AERO 426
Composite Materials Design (3-0-3)

Prerequisite: AERO 225/ MEEN 325

Overview of the reinforcements of composites, typical mechanical behavior of constituents and their properties, overview of manufacturing processes of composites, constitutive equation of linear elastic orthotropic materials, macro-mechanics of lamina, micro-mechanics of lamina, design principles of laminates, linear elastic analysis of composite beams, plates and stiffened panels, failure theories and strength analysis of a lamina.

AERO 430
Intermediate Aerodynamics (3-0-3)

Prerequisite: AERO 336

Fundamentals of the 1st and 2nd laws of thermodynamics applied to aerodynamic systems and control volumes. Applications of gas dynamics to incompressible and compressible flows through nozzles, diffusers, and airfoils. Isentropic flows to include Prandtl-Meyer expansions, and non-isentropic flows to include normal and oblique shocks, and flows with simple friction and heat transfer.

AERO 431
Viscous Flows (3-0-3)

Prerequisite: AERO 336

Viscous incompressible fluid flows. Topics include derivation of equations governing viscous compressible fluid motion; specializations to simple flows; boundary-layer theory; similarity solutions; introduction to turbulence and Reynolds stresses.

AERO 433
Introduction to Computational Fluid Dynamics (2-3-3)

Prerequisite: AERO/MEEN 335

The course provides the students with an introduction to the methods and analysis techniques used in computational solutions of fluid mechanics and aerodynamics problems. Model problems are used to study the interaction of physical processes and numerical techniques via computational fluid dynamics (CFD) software. The student will use the CFD techniques to solve some real world problems.

AERO 435
Rotorcraft Aerodynamics and Performance (3-0-3)

Prerequisite: AERO 335

Rotorcraft history and fundamentals. Momentum theory: hover, axial climb and descent, autorotation, forward flight, momentum theory for coaxial and tandem rotors. Blade element analysis. Rotor airfoil aerodynamics. Rotor blade dynamics and trim. Helicopter performance, height-velocity curves, conceptual design. High-speed rotorcraft.

AERO 440
Aerospace Propulsion (3-0-3)

Prerequisite: AERO 336

The mechanics and thermodynamics of aerospace propulsion systems including cycle analysis. Component analysis and operating principles of turbojet, turbofan, and other variations of air breathing aircraft propulsion units. Introduction to the operating principles of rocket and space propulsion units.

AERO 441
Introduction to Combustion (3-0-3)

Prerequisite: AERO/MEEN 240

Introduction to fuel types and classification, gas phase mixtures, combustion process and combustion thermodynamics. Emphasis on chemical equilibrium, chemical kinetics, and modeling of reacting fluid mechanical systems. Integration of these tools into the understanding and analyzing detonation phenomenon and laminar premixed and non-premixed flames.

AERO 450
Flight Dynamics and Stability (3-0-3)

Prerequisites: AERO 335; AERO 350

Airplane motions and coordinate systems; lift and drag; pitching moment and static stability; steady cruise of the airplane; rigid body dynamics in six degrees of freedom; modeling of the six aerodynamic force and moment coefficients; longitudinal motion and stability; lateral motion and stability; motion control and autopilot design via eigenvalue placement; examples of longitudinal motion control.

AERO 461
Aviation Management and Certification (3-0-3)

Prerequisite: Senior standing and approval of the department

Product development, quality control. Strategic organizational analysis and design. Airworthiness, type certification and planning, delegation of authority, airplane flight manual. Aerospace system design and safety.

AERO 465
Space Dynamics and Control (2-3-3)

Prerequisite: AERO 350

Basic concepts of orbital mechanics with application to satellites: keplerian motion, orbital elements, orbital transfer and fundamentals of state space control. Basic concepts of spacecraft attitude dynamics: three-dimensional rigid-body kinematics, stability and dynamics of symmetric and tri-inertial bodies, disturbance effects and attitude determination and control.

AERO 470**Aircraft Design Laboratory (0-6-3)**

Prerequisites: AERO 225; AERO 335; AERO 350

Aircraft design principles blending synthesis, analysis and test. The iterative nature of the design process. Elements of aircraft performance calculation and optimization. Extensive, design oriented laboratory experiments performed by student teams. Focus is on student design and realization of experimental procedure, instrumentation, and data acquisition and analysis, with extensive laboratory reports.

AERO 480**Aerospace Vehicle Performance (3-0-3)**

Co-requisite: AERO 440

Morphology of aircraft and spacecraft. Performance analysis of fixed wing aircraft: drag estimation, propulsion, take-off, climb and landing, endurance, payload/range, maneuvers; operational economics. Performance analysis of rotor craft: rotor-blade motion, hovering and vertical ascent, forward flight, and autorotation. Rocket propulsion; escape velocity; orbital dynamics.

AERO 485**Spacecraft Design (3-0-3)**

Prerequisite: AERO 350

Types of spacecraft. Fundamentals of orbital mechanics. The design of spacecraft and spacecraft subsystems with emphasis on mission requirements and current design methods: spacecraft configuration, payload, structural, propulsion, attitude control, thermal, power, communication and other related subsystems. Spacecraft integration and testing.

AERO 491**Independent Study II (Variable course credits from 1 to 3)**

Prerequisite: Approval of department and senior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

AERO 495**Special Topics in Aerospace Engineering**

Prerequisite: Topic specific

This course mainly deals with new trends in Aerospace Engineering and emerging technologies. Course is repeatable if title and content differ.

AERO 497**Senior Design Project I (1-6-3)**

Prerequisite: Senior Standing or approval of department

Participation in team projects dealing with design and development of a product or a system. Number of project will be offered each year by the different departments, some of which will have a multi-disciplinary nature. This will be an opportunity to exercise initiative, engineering judgment, self-reliance and creativity, in a team environment similar to industry. The design projects require students to draw upon their engineering background, experience, and other pertinent resources. Oral and written presentations are required.

AERO 498**Senior Design Project II (0-9-3)**

Prerequisite: AERO 497

Continuation of AERO 497

BMED BIOMEDICAL ENGINEERING**BMED 202****Biomedical Engineering Fundamentals (2-4-4)**

Prerequisite: ENGR 111

Co-requisites: MATH 206, PHYS 122

Introduction to the conservation laws of mass, energy, charge, and momentum in biological systems. Conservation equations for mass, energy, charge and momentum will be derived and applied using basic mathematical principle and physical laws.

BMED 211**Physiological Systems and Modeling I (2-4-4)**

Prerequisite: ENGR 112

Co-requisites: BMED 202; MATH 206

The primary objective of this course is to introduce to students on how to use mathematical modeling to describe homeostasis phenomena in human physiology at the protein, cell and organ level. Introducing the basics in control process as well as the concepts of model formulation, validation, and simulation will also be established. Chemical kinetics, transport equations and feedback systems will be the main focus in this course.

BMED 212**Physiological Systems and Modeling II (2-4-4)**

Prerequisite: BMED 211

The primary objective of this course is to apply the principles and concepts used in BMED 211 (Physiological Systems and Modeling I) to model the physiology of neuronal signaling, muscle, cardiovascular and respiratory systems. The course introduces these physiological systems, coupled with modeling techniques and mathematics of higher complexity. The models will be employed to relate to pathophysiology of the respective systems.

BMED 321**Mechanics for Biomedical Engineers (2-4-4)**

Prerequisites: BMED 202; MATH 206

This is an introductory course in engineering mechanics. The primary objective is to give students an understanding of the basic principles of statics (equilibrium), dynamics (kinematics and kinetics) and strength of materials (stress, strain, mechanical properties) as applied to problems in biomedical engineering.

BMED 322**Functional Biomechanics (2-4-4)**

Prerequisites: BMED 212; BMED 321

A study of the biomechanical principles underlying the kinetics and kinematics of normal and abnormal human motion. Emphasis is placed on the interaction between biomechanical and

physiologic factors (bone, joint, connective tissue and muscle physiology and structure) in skeletal-motor function and the application of such in testing and practice in rehabilitation.

BMED 331**Biotransport Phenomena (2-2-3)**

Co-requisites: MATH 206; BMED 212

The primary objective of this course is to study the fundamental principles of fluid, heat, and mass transfer with particular emphasis on physiological and biomedical systems. The course also explores the similarities between the fundamental principles of momentum, heat, and mass transfer and develops the mathematical description.

BMED 341**Molecular and Cellular Physiology I (3-3-4)**

Prerequisite: CHEM 211

Co-requisite: BMED 212

This course provide students with an advanced understanding of current topics and techniques in molecular biology, while developing skills in critical thinking and written expression. The goal of this course is to develop a comprehensive understanding of the basic fundamental concepts of molecular biology. This will be achieved both from the perspective of established molecular mechanisms for regulating the fundamental processes of a cell, and also from a technical laboratory-based applied perspective for using molecular biology as an experimental tool.

BMED 342**Molecular and Cellular Physiology II (3-3-4)**

Prerequisite: BMED 341

The primary objective of this course is to emphasize the study of eukaryotic cell structure and function, including bioenergetics, membrane transport, cellular communication, flow of genetic information, immune responses and cell division. Experimental techniques used in understanding cell biology will be discussed along with the cellular basis of human disease.

BMED 351
Biomedical Circuits and Signals (3-3-4)

Pre-requisites: PHYS 122, BMED 212

The primary objective of this course is to study analogue, digital electronic circuits and their application to biomedical instrumentation and physiological measurements. The course will focus strongly on electronic hardware and software design issues required to produce medical instruments, which satisfy International standards for safety, performance and quality control. Students will be equipped with the fundamental knowledge required to design Biosignal processing system.

BMED 352
Fundamentals of Biomedical Signal

Processing (3-3-4)

Prerequisite: BMED 351

The primary objective of this course is to study analogue and digital signal processing techniques and microcomputer system, and their application to biomedical instrumentation and physiological measurements. This course is designed for students who are expected to have prior knowledge in circuits and physiological system modelling. The main focus is on the technical aspects of biosignal processing and its hardware implementation in medical instruments.

BMED 391
Independent Study II (Variable course credits from 1 to 3)

Prerequisite: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

BMED 411
Biomaterials (3-0-3)

Prerequisite: BMED 321

Co-requisites: BMED 341

Introduction to the field of biomaterials used in the design of medical devices, and to augment or replace soft and hard tissues. In-depth coverage will be focused on basic material sciences, bulk properties, characterization techniques, applications, and in vivo behavior of different classes of natural and synthetic biomaterials. Analysis of biological response and biocompatibility, degradation and failure processes of implantable biomaterials/devices. This course involves a significant amount of application oriented topics in order to understand detailed characterization of biomaterials and it concludes with one major project (presentation in the end of the semester).

BMED 412
Regenerative Medicine (2-2-3)

Prerequisite: BMED 331

Co-requisites: BMED 342; CHEM 311

The purpose of the course is to provide a basic grounding in the principles and practice of regenerative medicine, this course will cover basic molecular and developmental biology relevant to the understanding of differentiation and development at the molecular, cellular and organismal levels.

BMED 413
Application of Bio-molecular Tools (2-2-3)

Prerequisite: CHEM 211

This course will focus on delivery of the principles of genomics, genetic epidemiology and DNA-based marker assisted testing. It will reinforce the basic principles of these disciplines with emphasis on case studies from forensic science, health science, food science and conservation to deliver a course with an emphasis on developing a student's practical and problem solving skills.

BMED 421
Physiological Control Systems (2-2-3)

Prerequisite: BMED 352; BMED 322

This course will expose students to the design of physiological control systems from engineering viewpoints. How states of "health" versus "disease" can be explained from the standpoint of physiological control system function (or dysfunction) will be studied.

BMED 422
Rehabilitation Engineering (2-2-3)

Prerequisite: BMED 322; BMED 352

This is a project-based course that focuses via literature search and experimental work on the rehabilitative and neural aspects of biomedical engineering, including human performance measurement and analysis, nerve stimulation, electromyography, motor control and stimulation; Students also learn about hardware and software applications for rehabilitation engineering and assistive devices.

BMED 423
Biorobotics and Medical Device Design (2-2-3)

Prerequisite: BMED 322; BMED 352

Fundamentals of Mechatronics. Interactions between surgical instruments and tissues. Intraoperative diagnostic technologies. Examples robots for diagnostics, surgery and therapy. Human-machine interfaces. Surgical navigators and tracking systems and simulators. Endoluminal devices. Instrumented catheters. Design requirements for orthopedic and cardiovascular devices. Extracorporeal Devices. Regulatory Affairs. Issues in medical device design. A design challenge based on real clinical needs.

BMED 430
Bioinformatics (2-2-3)

Prerequisite: ENGR 112, MATH 204; MATH 206

This course aims to introduce future engineers to bioinformatics tools and analysis methods. Fundamental and current topics in bioinformatics, genomics and proteomics will be highlighted through lectures and literature reviews, that

simultaneously develop critical thinking and oral presentations of students. Students will also familiarize themselves with the R project for statistical computing.

BMED 491
Independent Study III (Variable course credits from 1 to 3)

Prerequisite: Approval of department and senior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

BMED 495
Special Topics in Biomedical Engineering

Prerequisite: Topic Specific

This course mainly deals with new trends in Biomedical Engineering and emerging technologies. Course is repeatable if title and content differ.

BMED 497
Biomedical Engineering Senior Design I (1-6-3)

Prerequisite: Senior standing or approval of department

Participation in team projects dealing with design and development of a product or a system. Number of project will be offered each year by the different departments, some of which will have a multi-disciplinary nature. This will be an opportunity to exercise initiative, engineering judgment, self-reliance and creativity, in a team environment similar to industry. The design projects require students to draw upon their engineering background, experience, and other pertinent resources. Oral and written presentations are required.

BMED 498
Biomedical Engineering Senior Design II (0-9-3)

Prerequisite: BMED 497

Continuation of BMED 497.

CHEG CHEMICAL ENGINEERING**CHEG 205****Principles of Chemical Engineering (3-0-3)**

Co-requisites: PHYS 121; CHEM 116

Basic principles and calculations in chemical engineering. Processes and process variables. Introduction to the principles of conservation of mass and energy. Material and energy balances. Applications to chemical processing systems. Single and multi-phase systems. Balances on nonreactive and reactive processes.

CHEG 210**Introduction to Biochemical Engineering (3-0-3)**

Prerequisite: CHEG 205

Chemical engineers working in the process industries are making increased use of biological systems for production and environmental management. To optimize these processes, chemical engineers need to understand the fundamentals of biological processes and their applications. This course is designed to teach chemical engineers key modelling aspects associated with biochemical processes such as enzymatic reaction kinetics, cell growth models, chemostat, etc. Moreover, key principles of biomolecular sciences such as the basic structure and function of biomolecules/biomacromolecules, immobilized enzyme, cellular functions and genetic engineering will be covered.

CHEG 213**Experimental Design (3-0-3)**

Prerequisite: MATH 231

This course would develop the ability to design experiments, analyze and interpret data to make decisions by applying statistical tools. The course starts with description of random variables and probability distributions. The use of statistical decision-making tools, empirical models to optimize engineering systems are covered prior to application of designed experimentation. Finally application of statistical process control in manufacturing process to ensure product quality.

CHEG 230**Chemical Engineering Thermodynamics I (3-0-3)**

Prerequisites: CHEG 205; PHYS 122

Fundamentals of classical thermodynamics for application to chemical engineering processes and systems. Application of first and second laws to the analysis of thermodynamic cycles and processes; volumetric and thermodynamic properties of liquids and gases; heat effects.

CHEG 232**Fluid Mechanics (3-3-4)**

Prerequisite: CHEG 205

The course aims to develop a working knowledge of fluid mechanics through the theories, applications and experiments of transport processes and fluid flows in chemical engineering science. The course focuses on the fundamentals of macroscopic fluid phenomena and their practical applications in chemical engineering systems.

CHEG 312**Numerical Methods for Chemical Engineers (3-0-3)**

Prerequisite: MATH 206; ENGR 113

This course gives an extensive and broad introduction to the numerical solution of problems that a chemical engineer is most likely to encounter. The emphasis is to develop skills in logical thinking through designing mathematical and numerical solutions to chemical engineering problems. Materials to be covered include but not limited to: Systems of linear and non-linear algebraic equations; numerical integration; numerical solution of ODEs; and finite differences to solve elliptic and parabolic PDEs.

CHEG 324**Mass Transfer (3-0-3)**

Prerequisite: CHEG 335

The fundamentals of separation processes of interest to the chemical industry are covered. The principles of diffusion and convective mass transfer in gas, liquid, and solids are reviewed. The general mass and energy balances are established for continuous-contact and equilibrium-staged processes. The applications of these fundamentals

and the concepts of vapor-liquid and liquid-liquid equilibria to the unit operations of absorption, distillation, and extraction are discussed.

CHEG 325**Fundamentals of Nanotechnology (3-0-3)**

Prerequisite: PHYS 122

Introduction to the fundamental principles which govern product and process design in nano-engineering. Topics include: building of nanomaterials, properties and methods for nanomaterial characterization. Applications of nanotechnology in chemical, mechanical, environmental, biological, and electronics fields are covered.

CHEG 332**Chemical Engineering Thermodynamics II (3-3-4)**

Prerequisite: CHEG 230

Fundamentals of classical thermodynamics for application to chemical engineering processes and systems. Thermodynamic solution theory; multiphase equilibria of ideal and non-ideal systems, chemical reaction equilibria and topics in phase equilibria.

CHEG 335**Heat Transfer (3-3-4)**

Prerequisite: CHEG 230

Theory and applications of thermal energy transport: conduction, convection and radiation. Fundamentals of microscopic phenomena and application to macroscopic systems. Relevant aspects of computer-aided process simulation.

CHEG 350**Materials Science & Engineering (3-0-3)**

Prerequisites: CHEM 116 ; PHYS 122

Introduction to materials science and engineering. Metals, alloys, ceramics, polymers, and composites; inter-atomic bonding, crystal structure and defects; diffusion, nucleation and microstructure; phase diagrams and phase transformations; mechanical properties; material failure; corrosion and degradation.

CHEG 380**Introduction to Polymer Science and Engineering (2-3-3)**

Prerequisites: CHEM 211

Definitions, industry overview, nomenclature, basic organic chemistry of polymers, polymerization, molecular weight and molecular weight distribution. Basic polymer structure and thermo mechanical behaviour and structure property relationship. Mechanical properties, definitions, viscoelasticity, other mechanical properties. Basic rheology and introduction to polymer processing techniques, recycling. Concepts will be reinforced by the laboratory component of the course.

CHEG 381**Polymer Chemistry and Reaction Engineering (3-0-3)**

Prerequisites: CHEM 211

This course introduces the chemistry of polymerization and the polymer manufacturing process. It begins with basic concepts about polymers and polymerization and covers each major type of polymerization with relevant kinetics. The qualitative effect of reactor design on polymer manufacture is discussed as well as actual polymer manufacturing processes including those taking place in the UAE.

CHEG 391**Independent Study I (variable course credits from 1 to 3)**

Prerequisites: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

CHEG 395**Special Topics in Chemical Engineering**

Prerequisite: Topic specific

This course mainly deals with new trends in Chemical Engineering and emerging technologies. Course is repeatable if title and content differ.

CHEG 412**Process Dynamics & Control (3-3-4)**

Prerequisite: CHEG 443; CHEG 312

Mathematical modeling and analysis of transient systems. Applications of control theory to response of dynamic chemical engineering systems and processes.

CHEG 415**Combustion and Air Pollution Control (3-0-3)**

Prerequisite: CHEG 324; CHEG 335

This course presents the fundamentals of air pollution impact on the environment. Topics covered include hydrocarbon fuel energy, the different combustion devices and systems, pollutant emission predictions from chemical equilibrium and ideal flow reactors, design of flues and chimneys, atmospheric dispersion models, air pollution sampling and measurement, and air pollution control methods and equipment. Applications in the petroleum industry are stressed.

CHEG 416**Corrosion Engineering (3-0-3)**

Prerequisite: Senior Standing

This course presents fundamental material on corrosion and oxidation thermodynamics and electrochemical thermodynamics. The course then describes commonly encountered corrosion environments and discusses typical forms of corrosion encountered in each environment typical to the petroleum industry. Methods of corrosion control are then described, and the course concludes with a description of important corrosion and oxidation monitoring techniques.

CHEG 423**Gas Processing Engineering (2-3-3)**

Prerequisite: CHEG 332; CHEG 324

An overview of natural gas industry, from wellhead to market place. Process flow diagram of gas plant. Description and design of the major processes for gas compression, dehydration, acid gas removal and tail gas cleanup, sulfur recovery, cryogenic extraction of natural gas liquids (NGL). Process simulation of natural gas processes.

CHEG 424**Petroleum Refining and Processing (3-0-3)**

Prerequisite: CHEG 324

Characterization of crude oil. Petroleum products and refinery configuration. Basics on heterogeneous catalysis. Unit operations of petroleum refining including distillation, catalytic cracking, reforming, hydrotreating and hydrocracking, coking and gas treatment. Gasoline components. Refinery products and economics. Manufacture of petrochemical feedstocks from petroleum and petroleum products. Environmental control. Refinery safety measures and handling of hazardous materials. Quality control of products.

CHEG 443**Reaction Engineering (3-3-4)**

Prerequisite: CHEG 332; CHEM 211

Applications of the fundamentals of thermodynamics, physical chemistry, and organic chemistry to the engineering of reactive processes. Reactor design; acquisition and analysis of rate data; heterogeneous catalysis. Relevant aspects of computer-aided process simulation.

CHEG 470**Industrial Catalysis (3-0-3)**

Prerequisite: CHEG 230

The course presents basic concepts of catalysis and briefly reviews different categories of catalysts with commercial importance for oil and gas processing as well as for petrochemical and other chemical commodities manufacturing. The core of the course is focused on heterogeneous catalysis and to a smaller extent to homogeneous catalysis. Catalytic materials, their properties and preparation, catalyst characterization and selection are presented with an emphasis on new synthesis and characterization methods. Several case studies of industrial processes are selected to offer an insight into the strong interaction among catalyst type, catalytic reactor design and process operating variables. The selected processes are analyzed in their evolution, limits and challenges and new technological solutions are suggested.

CHEG 472**Water Treatment and Membrane Processes (3-0-3)**

Prerequisite: CHEG 324

This course deals with the fundamental principles and practical applications of membrane processes in water treatment facilities. The topics covered in this course are water chemistry, membrane structure and performance, membrane transport, concentration polarization, membrane fouling and fouling characterization in relation to water engineering. Applications of nano-filtration, ultra-filtration, micro-filtration, reverse osmosis, and electro-dialysis membranes in various water treatment plants are covered.

CHEG 485**Separation Processes (3-3-4)**

Prerequisite: CHEG 324

This course presents an overview of all industrially relevant separation processes, including equilibrium based separations (distillation, absorption, extraction), rate-controlled separation processes (adsorption, drying, crystallization, membrane separation) and mechanical separations (filtration, sedimentation). For every separation process, you should be able to understand the basic fundamentals, to calculate the mass and energy balances, and to determine the feasibility and equipment sizing.

CHEG 488**Polymer Properties (3-0-3)**

Prerequisite: CHEG 380

Review and discussion of the properties of polymers with emphasis on structure-property correlations. The principles and practical applications of the main techniques used for characterization of the mechanical, physical, and transport properties will be discussed. Some applications of polymers in relationship to their properties are illustrated.

CHEG 491**Independent Study II (variable course credits from 1 to 3)**

Prerequisites: Approval of department and senior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

CHEG 495**Special Topics in Chemical Engineering**

Prerequisite: Topic specific

This course mainly deals with new trends in Chemical and Petroleum Engineering and emerging technologies. Course is repeatable if title and content differ.

CHEG 497**Senior Design Project I (2-3-3)**

Prerequisite: CHEG 213; CHEG 324

The students learn the design process including: problem definition and analysis; process synthesis, process simulation and modeling; safety and environmental protection in design; written and oral communication for design reports. A significant portion of the term work will be devoted to a group design project, culminating in a preliminary design proposal that will be presented to the department.

CHEG 498**Senior Design Project II (3-0-3)**

Prerequisite: CHEG 497

Continuation of CHEG 497

CIVE CIVIL ENGINEERING**CIVE 180****Engineering Graphics and Visualization (3-0-3)**

Prerequisite: ENGR 113

This course is an introduction to graphical communication concepts and tools used by engineers. It covers visualization and technical sketching skills, implications related to manufacturing processes, computer-aided design methods, and development and interpretation of drawings of civil engineering structures.

CIVE 200**Statics (3-0-3)**

*(Cross listed with AERO 200; MEEN 200)

Prerequisite: PHYS 121

A vector treatment of force systems and their resultants: equilibrium of trusses, beams, frames, and machines, including internal forces and three-dimensional configurations, static friction, properties of areas, and distributed loads and hydrostatics.

CIVE 201**Engineering Dynamics (3-0-3)**

*(Cross listed with AERO 201; MEEN 201)

Prerequisite: CIVE 200

Co-requisites: MATH 204; MATH 206

This course introduces rectilinear and curvilinear motion of particles and rigid bodies, kinematics and kinetics of particles and rigid bodies, rotational and translational motion of rigid bodies, principle of work and energy, and principle of impulse and momentum in particles and rigid body dynamics.

CIVE 225**Mechanics of Solids (3-3-4)**

(Cross listed with AERO 225 and MEEN 325)

Prerequisite: CIVE 200

The course is an introduction to the mechanics of deformable solids applied to basic engineering structures. It covers the concepts of stress and strain at a point; factor of safety in design, deformation of axially loaded members; symmetric and unsymmetric bending of elastic and elastic-

perfectly plastic beams; torsion of open and closed section; beam deflection; stress and strain transformations, and elastic buckling of columns.

CIVE 310**Geomatics (2-3-3)**

Prerequisites: CIVE 180; MATH 112

The course is an introduction to Geomatics. It covers Plane and topographic surveying; distance, angle, and elevation difference measurement; error theory; traverse computations; topographic mapping; horizontal and vertical curves; CADD applications; GPS and GIS.

CIVE 332**Fundamentals of Construction Engineering & Management (3-0-3)**

Prerequisite: ENGR 111

This course offers a sampler of the broad construction engineering and project management topics. It covers the project management tools and practices as performed throughout the construction processes, including bidding; contract format and construction administration; construction documents; reading and interpreting contract plans; project planning and scheduling; resource management and project control; cash flow analysis; risk management and safety in construction.

CIVE 335**Fluid Mechanics (3-3-4)**

Prerequisites: PHYS 121; MATH 231

This course introduces students to concepts of fluids and examines the forces on them. Conservation of mass, momentum, and energy are fundamental to the physics. Various mathematical representations are considered, including differential and integral formulations. The complexity of fluid dynamics motivates the notions of simplifying assumptions, dimensional analysis, and boundary layers among others.

CIVE 336**Civil Engineering Materials (3-3-4)**

Prerequisites: CHEM 115; CIVE 225

The course is an introduction to scientific concepts of civil engineering materials. It covers relationship between macroscopic material properties and response and microscopic properties; physical, mechanical, surface, fracture, and rheological properties of civil engineering materials including metals, composites, polymers, and Portland cement concrete.

CIVE 338**Geotechnical Engineering (3-3-4)**

Prerequisite: CIVE 225

This course is an introduction to the basic principles that govern the behavior of soils, foundations, and other geotechnical engineering works. The central concepts to be covered in this class are: engineering properties of soils, soil classification, permeability, stresses in soil due to applied loads, consolidation, compaction, shear strength and applications to engineering design.

CIVE 340**Behavior and Analysis of Structures (3-0-3)**

Prerequisite: CIVE 225

This course is to study behavior and analysis of statically determinate and indeterminate beams, frames, and trusses. It covers displacement calculations using the method of virtual work, analysis of statically indeterminate structures by consistent displacements and slope-deflection equations, and the basic fundamentals of using the direct stiffness method for analyzing structures.

CIVE 341**Design of Steel Structures (3-0-3)**

Prerequisites: CIVE 336; CIVE 340

This course is to understand the fundamentals of the design of steel structural members such as beams and columns and their connections based on the Load and Resistance Factor Design method. It covers design of structural members for tension, flexure, shear, compression, and combined loads, and design of bolted and welded connections.

CIVE 370**Introduction to Environmental Engineering (3-3-4)**

Prerequisites: CHEM 115; MATH 112

This course introduces environmental problems and their resolutions including water and wastewater treatment, air pollution and control, and solid and hazardous waste management. It covers the fundamental theory, principles, and preliminary design of unit operations in environmental engineering. Laboratory classes illustrate analytical techniques used in the analysis of environmental samples, and demonstrate the mechanisms involved in the treatment processes.

CIVE 380**Transportation Engineering (2-3-3)**

Prerequisite: CIVE 310

This course is an introduction to transportation engineering with specific emphasis on the planning, spatial design, and operation of transportation facilities including highways, ramps, signal lights, pedestrian crossings and stop signs. Factors that cause congestions are analyzed and solutions are discussed.

CIVE 391**Independent Study I (Variable course credits from 1 to 3)**

Prerequisites: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

CIVE 442**Design of Concrete Structures (3-0-3)**

Prerequisites: CIVE 336; CIVE 340

This course is a basic understanding of the analysis and design of reinforced concrete structures. It covers properties of reinforced concrete, behavior and ultimate strength design of reinforced concrete beams, slabs, columns, and footings, and design for flexure, shear, compression, bond, and anchorage.

CIVE 450**Coastal Engineering (3-0-3)**

Prerequisites: CIVE 335; CIVE 370

This course is designed to give an overview of the analysis and design procedures used in the field of coastal engineering. The course covers basic wave properties in the near shore region, coastal sediment transport processes and the preliminary design of shore and harbor protection structures.

CIVE 455**Blast Effects and Modern Protective Infrastructures (3-0-3)**

Prerequisites: CIVE 341; CIVE 442

Threat and Hazard Assessment. Conventional and Nuclear Environments. Conventional and Nuclear Loads on Structures. Behavior of Structural Elements. Dynamic Response and Analysis. Connections, Openings, Interfaces, and Internal Shock. Structural Systems-Behavior and Design Philosophy.

CIVE 463**Water and Wastewater Treatment Technologies (3-0-3)**

Prerequisites: CIVE 335; CIVE 370

Design of unit operations for coagulation, sedimentation, filtration and disinfection for treatment of drinking water. Introduce the chemistry of drinking water treatment processes. Design of facilities for physical, chemical, and biological treatment of wastewater; and treatment and disposal of sludge. Coverage of advanced wastewater treatment and land treatment systems.

CIVE 465**Ground and Surface Water Hydrology and Contaminant Transport (3-0-3)**

Prerequisites: CIVE 335; CIVE 370

A comprehensive introduction to groundwater and surface water hydrology. Contaminant transport of hazardous chemicals, environmental regulations, groundwater flow, well hydraulics, transport of contaminants in the subsurface environment, hydrologic cycle, surface water hydrology, hydrographs, rational method for storm water runoff, and storm water collection system design.

CIVE 469**Air Pollution (3-0-3)**

Prerequisites: CHEM 115; CIVE/MEEN 335

An in-depth instruction into air pollution covering such topics as the causes, sources, and effects of air pollution. Topics include: legislative standards (ambient and source) for pollutants, regional and global air pollution issues, indoor air pollution, air pollution instrumentation and gas flow measurements, basic meteorology, and design of facilities for air pollution control.

CIVE 470**Foundation Engineering (3-3-4)**

Prerequisite: CIVE 338

This course focuses on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles, and drilled piers. Coverage includes bearing capacity, settlement, and group effects of the various foundation types. Additional topics include geotechnical proposal and report writing, subsurface exploration, and construction of deep foundations.

CIVE 472**Pavement Design and Transportation (3-0-3)**

Prerequisites: CIVE 338; CIVE 380

Fundamental theory and design principles of both flexible and rigid pavements. Theory and practice in transportation systems to include airfield and highway design, traffic analyses, horizontal and vertical roadway alignment, pavement evaluation and maintenance, strengthening techniques, and repair.

CIVE 473**Structural Building Design (3-0-3)**

Prerequisites: CIVE 341; CIVE 442

Design of a multi-story steel and reinforced concrete building, including structural frame, floor and roof system, and foundation. Computer-aided analysis and design.

CIVE 475**Earth Structures: Embankment, Slopes & Buried Structures (3-0-3)**

Prerequisites: CIVE 338; CIVE 442

Analysis of lateral earth pressures, slope stability, and stresses on buried structures, design of cantilever retaining walls, mechanically stabilized earth walls, sheet piling, and slurry walls.

CIVE 480**Project Management and Contract Administration (3-0-3)**

Prerequisite: CIVE 332

Students take an owner's project requirements through stages of scope definition, budgeting and planning, conceptual design, scheduling, and construction contract administration. Students apply engineering standards and consider realistic issues including engineering economics, constructability, environmental requirements, sustainability, and safety. The course addresses and applies management topics and concepts of planning, organizing, leading, and controlling in the context of a capstone engineering project. The course concludes with a project competition involving construction industry professionals.

CIVE 482**Project Control and Life Cycle Execution of Constructed Facilities (3-0-3)**

Prerequisite: CIVE 332

This course continues an introduction to construction management and engineering concepts for future engineers, contractors and owner representatives involved at different stages in the life-cycle of constructed facilities. This course introduces further awareness of analytical tools and extends the basic foundation for advanced topics in construction engineering and management.

CIVE 484**Project Planning, Scheduling and Control (3-0-3)**

Prerequisite: CIVE 332

This course emphasizes the fundamental principles of modern management methods

of planning and scheduling for construction projects. Covered topics include pre-bid planning; construction project planning using WBS; project network; estimating activity duration, CPM scheduling; resource management using resource allocation and leveling; project time-cost trade-offs; project monitoring and control; and, earned value analysis integrating cost and schedule.

CIVE 485**Construction Project Management (3-0-3)**

Prerequisite: CIVE 480

This course emphasizes the methods and materials of construction as well as the management practices required to run a successful construction project. Topics include construction materials, project planning, scheduling, cost estimating, and field engineering. A semester project, in the form of a detailed study of a major construction project, complements the classroom experience.

CIVE 488**Advanced Construction Management (3-0-3)**

Prerequisite: CIVE 485

This course will cover construction methods, equipment, and cost estimation of construction materials, excavation, foundation, retaining walls, formwork, pavements and other aspects of civil engineering construction projects by integrating geotechnical reports, materials specifications, quality control, equipment, estimation, scheduling, and design details.

CIVE 491**Independent Study II (Variable course credits from 1 to 3)**

Prerequisite: Approval of department and senior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member.

A formal report is required.

CIVE 492**Urban Transit Planning and Operations (3-0-3)**

Prerequisite: CIVE 380

The objective of this course is to introduce the fundamentals of urban transit planning and operations. The course will cover several topics, including public transit planning, role of transit in urban areas, classification of transit modes, fundamentals of transit performance and operational analysis, capacity analysis, scheduling, network design, transit economics, and mode selection.

CIVE 493**Airport Planning and Traffic Management (3-0-3)**

Prerequisite: CIVE 380

This course introduces students to the fundamentals of airport systems, airport operations, and airport administrative management. The course topics includes the history of airport systems, planning, operations of airfields, airspace and traffic management, terminals and ground access, security, economic perspectives, and capacity/delay analyses.

CIVE 495**Special Topics in Civil Engineering**

Prerequisite: Topic specific

This course mainly deals with new trends in Civil Engineering and emerging technologies. Course is repeatable if title and content differ.

CIVE 497**Senior Design Project I (1-6-3)**

Prerequisite: Senior standing or approval of department

Participation in team projects dealing with design and development of a product or a system. Number of project will be offered each year by the different departments, some of which will have a multi-disciplinary nature. This will be an opportunity to exercise initiative, engineering judgment, self-reliance and creativity, in a team environment similar to industry. The design projects require students to draw upon their

engineering background, experience, and other pertinent resources. Oral and written presentations are required.

CIVE 498**Senior Design Project II (0-9-3)**

Prerequisite: CIVE 497

Continuation of CIVE 497.

ECCE ELECTRICAL AND COMPUTER ENGINEERING**ECCE 200****Fundamentals of Electronic Systems (3-3-4)**

Prerequisite: PHYS 122

Restrictions: This course is for non ECE students only.

Voltage source, Current Source, Energy Sources, Electrical Motor and Generator basic principle, Ohm's Law, KVL and KCL circuits. DC steady state analysis of Resistive, RC, RL, and RLC circuit, Basic circuit theory nodal, mesh and source transformation. Transient analysis of simple electric circuits RC, and RL and some application. Basic operation of semiconductor devices. Diode, BJT and its applications. Description of Small signal amplifier circuits and operational amplifiers. Binary system and basic logic gates. Design of simple combinational and sequential logic circuits.

ECCE 210**Digital Logic Design (3-3-4)**

Prerequisite: ENGR 112 or ENGR 113

Data representation in digital computers. Boolean algebra. Minimization and implementation of logic functions. Design of combinational circuits. Programmable devices, multiplexers, decoders, memory and tri-state devices. Basic ALU design. Elements of sequential circuits: latches, flip-flops and counters. Design of synchronous sequential machines. Introduction to CAD tools and hardware description languages. Laboratory experiments provide hands-on experience in the simulation, implementation and testing of combinational and sequential logic circuits.

ECCE 221**Electric Circuits I (3-3-4)**

Co-requisites: MATH 232; PHYS 122

Physical principles underlying the modeling of circuit elements. Basic circuit elements: resistance; inductance, capacitance, independent and controlled sources, and op-amps. Circuit analysis techniques, steady-state and transient responses, first-order circuits, complex numbers, sinusoidal steady-state analysis, sinusoidal steady-state power calculations, and balanced three-phase circuits.

ECCE 222**Electric Circuits II (3-3-4)**

Prerequisite: ECCE 221

Co-requisite: MATH 206

Time-domain transient analysis, Laplace transform, s-domain circuit analysis, State variable circuit analysis, frequency selective circuits, first order passive filters, Bode diagrams, two-port networks, Mutual inductance and transformers.

ECCE 230**Object-Oriented Programming (3-3-4)**

Prerequisite: ENGR 112 or ENGR 113

Foundation of object oriented concepts and programming. Basic Object Oriented Programming (OOP) concepts: objects, classes, methods, parameter passing, information hiding, inheritance, exception handling and polymorphism. Java language elements and characteristics, including data types, operators, control structures, search and sort algorithms.

ECCE 300**Signals and Communications (3-0-3)**

Prerequisite: MATH 206

Restrictions: Students majoring in Electrical and Computer Engineering are not allowed to take this course.

Complex numbers and functions, conformal mapping, analytic functions, elements of residue theory, Fourier and Laplace transform and its properties and linear time invariant

systems. Introduction to data and computer communications, fundamentals of computer networks theory, design, protocols, analysis and operation, OSI model, data transmissions and transmission media, local and wide area networks and IP networks, computer networks and their protocols.

ECCE 302**Signals and Systems (3-0-3)**

Prerequisites: MATH 232; MATH 204

Co-requisite: ECCE 221

Time/space-domain analysis of analog and discrete signals: basic signals, properties and operations. Frequency analysis of signals: Fourier series and transform, Laplace transform, sampling and reconstruction and z-transform. Time/space-domain analysis of signal processing systems: properties, block diagrams, differential/difference equations, state-space model of LTI systems, impulse response, and convolution. Frequency analysis of signal processing systems: frequency response (gain and phase), transfer function, z-transfer function, stability analysis, Fundamentals of analog filter design.

ECCE 312**Electronic Circuits and Devices (3-3-4)**

Prerequisite: ECCE 221

Introduction to semiconductors. Operation of pn-junction and its applications as rectifiers, clippers, and voltage regulators. Operation of bipolar junction transistors (BJT) and field effect transistors (FET). Small signal modeling of BJTs and FETs. Use of BJTs and FETs as single stage amplifiers. BJT, JFET and MOSFET differential and multistage amplifiers. Amplifier classification and Power amplifiers. Practical nonlinear operational amplifier circuits.

ECCE 316
Microprocessor Systems (3-3-4)

Prerequisites: ECCE 210

Introduction to current microprocessor, microcontroller and microcomputer systems: basic components, memory map, organization and processor architecture. Hardware and software models of microprocessor and microcontroller systems. Processor instructions and assembly language programming. Exception handling: interrupts, traps and exception processing. Memory decoding, input/output interfaces and programming peripheral devices. Laboratory experiments provide hands-on experience in the use of cross-assemblers, C-programming, simulators and actual microprocessor/microcontroller hardware.

ECCE 320
Applied Electromagnetics (3-0-3)

Prerequisites: PHYS 122; MATH 204

Co-requisite: MATH 206

Review of Vector analysis, Electrostatics (Electric fields, boundary value problem), Magneto statics (magneto static fields, magnetic force), Maxwell's Equations, Plane Wave propagation, Transmission lines.

ECCE 322
Electrical Machines (3-3-4)

Prerequisites: ECCE 221; ECCE 320

Magnetic circuit concepts and materials, transformer analysis and operation, steady state analysis of rotating machines. Study of the basic machine types: dc, induction and synchronous. A laboratory is integrated into the course; the focus of the laboratory is on the characteristics of machines and transformers.

ECCE 323
Feedback Control Systems (3-3-4)

Prerequisite: ECCE 302

Systems modelling using ordinary differential equations and transfer functions is presented. Modelling of electrical, mechanical,

electromechanical, and fluid systems is discussed. System performance and error analysis. Feedback control analysis techniques using root locus and frequency response (Bode and Nyquist) are introduced for systematic stability analysis of systems. Lag/lead controller design, PID controller design. Introduction to State-space controller design.

ECCE 326
Introduction to Semiconductor Devices (4-0-4)

Prerequisites: MATH 206; PHYS 122

This course is designed to provide an introduction to the mechanisms of device operation. It introduces and explains terminology, models, properties, and concepts associated with semiconductor devices and offer insight into the internal workings of the "building-block" device structures such as the pn-junction diode, Schottky diode, BJT, and MOSFET.

ECCE 330
System Analysis & Software Design (3-0-3)

Prerequisite: ECCE 336

Design principles, patterns, notations and methodologies with focus on object-oriented and scenario-based design. From requirements to design to implementation; reconcile the models; refining and verifying the models; Domain partitioning; object design; Model-driven design and Unified Modeling Language (UML). Structural and behavioral design descriptions and specifications; Adding software behavior; Introduction to software architecture (styles and view models); Test-driven development; User interfaces.

ECCE 336
Introduction to Software Engineering (3-0-3)

Prerequisite: ECCE 230

Introduction to Software Engineering; The Software Process; Project Management Concepts; Software Requirements Engineering Using Unified Modeling Language (UML) Use-Cases; System Models; Architectural Design; Object-Oriented Software Design; Testing and Maintenance; Emerging software development methods.

ECCE 341
Java and Network Programming (2-3-3)

Prerequisite: ECCE 230

Java basics, exception handling, I/O. Java Graphics: applets, AWT, Swing, Graphics, listeners. Java OO features: inheritance, abstract classes, polymorphism, interfaces, inner classes, anonymous classes. Basics of network programming. Java network programming: multithreading, URLs, sockets, RMI. Emerging Mobile Java Technology.

ECCE 342
Data Structures and Algorithms (2-3-3)

Prerequisites: ECCE 230; MATH 234

Review of object-oriented design. Learning the Standard Template Library (STL) data structures and algorithms with practical examples. Analysis of algorithm complexity. Fundamental data structures: Concept of Abstract Data Types (ADTs), Queues, Stacks, Lists, Trees; Fundamental computing algorithms: binary search trees, hash tables, heaps, balanced trees, sorting algorithms, searching algorithms.

ECCE 350
Computer Architecture and Organization (3-0-3)

Prerequisite: ENGR 112 or ENGR 113

Co-requisite: ECCE 210

Fundamentals of computer system design. Measuring and reporting performance. Elements of machine and assembly languages. Instructions types and formats, operations, addressing modes, stacks. Classifying instruction set architecture. Data representations, Computer arithmetic, ALU design. Pipelining, instruction pipelining, hazards, pipeline performance. Memory system hierarchy design and cache memory. I/O fundamentals and operations and interrupt handling. Introduction to parallel computers and alternative architectures.

ECCE 354
Operating Systems (3-0-3)

Prerequisite: ECCE 350

Historical perspective of operating systems. Operating system concepts, functions and structure. Processes, threads, process synchronization, interprocess communication, process scheduling. Deadlock management. Memory management and virtual memory. Device management. File management. OS Security and Protection.

ECCE 356
Computer Networks (3-3-4)

Prerequisite: ECCE 210

Introduction to computer networks. Fundamentals of computer networks theory, design, implementation, protocols, analysis and operation. OSI model. Data transmissions and transmission media. Local and wide area networks, IP networks, switching techniques, routing, congestion control, quality of service. Principles of network applications. Introduction to network security. Implementation, analysis and management of computer networks and their various protocols.

ECCE 360
Communication Systems (3-3-4)

Prerequisite: MATH 232

Co-requisite: ECCE 302

Signal Analysis. Probability and Stochastic Processes. Linear and Non-linear Modulation: DSB-AM, DSB-SC, SSB-SC, Frequency/Phase Modulation (FM/PM). Noise effects in Analog Systems. Multiplexing: Frequency Division Multiplexing (FDM). Principles of operations of telephony.

ECCE 362**Digital Communications I (2-3-3)**

Prerequisite: ECCE 360

Introduction to Digital Communication. Spectral Density Autocorrelation. Bandwidth of Digital Data. Baseband Systems. Formatting Textual Data, Messages, Characters, and Symbols. Sources of Corruption. Pulse Code Modulation. Uniform and Nonuniform Quantization. Baseband Modulation. Source Coding. Signals and Noise. Detection of Binary Signals in Gaussian Noise. Intersymbol Interference (bandwidth limited channels). Pulse shaping. Eye diagrams. Equalization. Digital Bandpass Modulation Techniques. Detection of Signals in Gaussian Noise. Coherent Detection. Noncoherent Detection. Complex Envelope. Error Performance for Binary Systems in AWGN channels.

ECCE 391**Independent Study I (Variable course credits from 1 to 3)**

Prerequisite: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

ECCE 401**Filter synthesis (3-0-3)**

Prerequisite: ECCE 302

Design of passive filters: Approximation theory, network synthesis and frequency transformation. Delay filters. Continuous-time active filters: single and multiple-amplifier filters using operational and operational-trans conductance amplifiers, second and high-order sections. Switched-capacitor filters. Introduction to RF filters design. Designing filters using CAD packages.

ECCE 402**Digital Signal Processing (2-3-3)**

Prerequisite: ECCE 302

Fundamentals of discrete signals and digital signal processing. Models of digital filters. Design and analysis of FIR and IIR Filters. Realization of digital filters. Fourier analysis and processing. Selected applications.

ECCE 404**Microwave Circuits and Devices (3-0-3)**

Prerequisite: ECCE 312

Type of transmission lines suitable for low and high frequency applications. Components, connectors, cavities, dielectric resonators, terminations, couplers, T-junction, isolators and impedance transformers. Review of the Smith chart and applications. Microwave devices, diodes, bipolar and FET transistors. Amplifier design considerations. Operation of single and double balanced mixers. Signal amplification using Klystrons and traveling wave tubes.

ECCE 406**Instrumentation and Measurements (2-3-3)**

Prerequisites: ECCE 302; ECCE 312

Measurements of L, C and R using bridge circuits. Z-, y-, abcd- and s-parameters. Microwave measuring equipments such as spectrum and network analyzers. Digital Measurement systems and data acquisitions. Logic analyzers. Types and descriptions of data acquisition systems. Performing advanced measurements using spectrum and network analyzers such as time domain reflectometer measurements, and noise measurements.

ECCE 408**Digital Systems Design (3-0-3)**

Prerequisite: ECCE 210

Design and analysis of practical modern digital systems. Simulation, synthesis, and FPGA-based implementation of digital systems using hardware description languages (HDLs). Design space of integer and floating-point arithmetic units. Power- and performance-oriented design techniques and evaluation metrics.

ECCE 410**VLSI Systems Design (3-0-3)**

Prerequisites: ECCE 312; ECCE 210

Introduction to the fabrication of digital VLSI (Very Large Scale Integrated Circuits) systems. Design and layout of VLSI circuits for complex digital systems. CMOS technology using standard-cell-based design flow. Circuit characterization and performance. Interconnect, timing and synchronization issues. Low-power and deep submicron designs. Fault models and design for testability techniques. VLSI design methodologies. Commercial CAD simulation and synthesis tools.

ECCE 411**Analog Integrated Circuits Design (3-0-3)**

Prerequisite: ECCE 312

CMOS analog circuit modeling. CMOS device characterization. CMOS building blocks. Two-stage CMOS amplifiers. High-performance op-amps. Introduction to Switched-Capacitor Circuits. CAD simulation software tools for analog circuit design.

ECCE 420**Industrial Automation (3-0-3)**

Prerequisite: ECCE 406

Principles of industrial automation with emphasis on oil and gas industries. Topics on sensors, actuators, field devices, signal conditioning, PLCs, and ladder logic programming are covered in theory and practice. Different types of closed loop controllers, system modeling, SCADA, and DCS are also addressed.

ECCE 421**Power System Analysis (3-0-3)**

Prerequisite: ECCE 322

Power system analysis is a concern not only for big generators and operators of the public electricity network. It is also the business of those who generate, transform and distribute their own power (for example, large sections of the petrochemical industry) and those who rely on efficiently transmitted power for transport of passengers and goods. The effective, efficient and reliable generation, transmission and distribution

of electrical power at the most economic rates is thus basic to the success of any modern economy.

ECCE 422**High Voltage Engineering (3-0-3)**

Prerequisite: ECCE 322

The course covers the basic concepts of electrical insulation requirements and over voltages in power system. It includes over voltages in electrical systems, electrical breakdown in gases, solids and liquids, generation of high voltages and high currents, measurements of high voltages and currents, high voltage testing and insulation, overhead insulators (material, shape, performance), underground cables (single and three-core cables, electrical stresses in cables; equivalent circuits).

ECCE 423**Power Electronics (3-0-3)**

Prerequisites: ECCE 312; ECCE 322

Operation of power semiconductor devices such as power diodes, IGBTs, MOSFETs, and thyristors; Switching losses, snubber circuits, single/three phase(s), half/full wave, half/fully controlled converters with R, RL, and RLC loads, continuous and discontinuous current operations, effect of overlap, design of power converters circuits and their applications on DC electric drives motion control, PSpice simulator.

ECCE 424**Electrical Power Distribution Systems (3-0-3)**

Prerequisite: ECCE 421

Electric power distribution system planning, design and operations; load characteristics and distribution transformers; design of sub-transmission lines and distribution substations; primary and secondary feeder design considerations; distribution system voltage regulation, protection and reliability; distributed generation and smart grid application.

ECCE 425**Power System Stability and Control (3-0-3)**

Prerequisites: ECCE 322; ECCE 421

The course covers the basic concepts of power system stability; including steady-state stability studies, using small-signal dynamic models, and transient stability analysis considering both rotor angle (equal area criteria) and time (time-stepping solutions). Power-frequency control and voltage-reactive power control in an interconnected power network are then discussed before a brief examination of the process of voltage collapse.

ECCE 426**Power Electronics for Renewables Integration (3-0-3)**

Prerequisite: ECCE 423

The course covers the design and operation of single-phase and three-phase AC Voltage Regulators, design and operation of DC-to-AC single-phase and three-phase inverters, voltage controlled and current controlled inverters, square wave and PWM inverters design, applications of power semi-conductor devices on motion control of AC electric drives and Power Systems, integration of wind and solar photovoltaic energy conversion systems, PSpice simulator.

ECCE 427**Power System Protection (3-0-3)**

Prerequisite: ECCE 421

Introduction and general philosophies of power system protection, Per-unit system, Symmetrical fault calculation, Potential and Current Transformers, Fuse Protection, Electromagnetic and Static Relays, Relay coordination, Basics of Transformer, Motor, and Generator Protections, Line Protection, Basic Distance Protection.

ECCE 428**Modern Control Systems (3-0-3)**

Prerequisite: ECCE 323

Design of modern control systems using matrix approach and the linear systems tools in Matlab; examples from electrical and mechanical engineering; realization techniques; discretization of continuous systems; controllability, observability

and their Gramians, other dynamical system properties; pole-placement; disturbance rejection; Lyapunov stability; state estimation; introduction to multivariable systems; introduction to intelligent control systems.

ECCE 429**Digital Control Systems (3-0-3)**

Prerequisite: ECCE 323

This course is concerned with the analysis and design of closed-loop systems that contain a digital computer. Distinction is emphasized between a purely digital system and a continuous system that may be sampled to emulate a digital system. Topics covered include sampling, signal conversion and processing (hold devices; z-transform; state variable technique; pole-assignment and state estimation; stability of digital control systems; digital simulation and redesign; time and frequency domain analyses; digital filter structures and microcomputer implementation of digital filters.

ECCE 432**Introduction to Human Computer Interfaces (3-0-3)**

Prerequisite: ECCE 336

Human Factors of Interactive Software; HCI Theories Principles and Guidelines; HCI Design; Principles of user interface design, development, and programming; HCI Development Tools; Expert Reviews; Usability Testing; User interface evaluation; Web based user interfaces.

ECCE 434**Database Systems (2-2-3)**

Prerequisite: ECCE 336

Introduction to the theory, design and implementation of database systems; Data models; Entity-relationship model; Relational model; SQL query language; Data integrity; Normalization; Storage access.

ECCE 436**Software Testing and Quality Assurance (3-0-3)**

Prerequisite: ECCE 336

Overview of the maintenance and testing activities within the software life cycle; Software Maintenance: Major maintenance activities. Estimating maintenance costs and productivity; Quality Assurance: Examination of various quality/complexity metrics; Software validation planning; Software testing fundamentals including test plan creation and test case generation, black-box and white-box testing techniques, unit integration, validation and system testing, and object-oriented testing.

ECCE 438**Software Architecture (3-0-3)**

Co-requisite: ECCE 330

Introduction to Software Architecture; Architecture Descriptions: Architecture Description Languages, Architecture Styles, A Model of software Architecture; Repository Model; Layered Model; Client-Server Model; Inter-Process Communication: Remote Procedure Call (RPC) versus Object Request Broker (ORB); N-Tiered Client-Server; Design Patterns; Specialized Software Architectures; Techniques and criteria used for the evaluation of software architecture.

ECCE 440**Distributed Systems (3-0-3)**

Prerequisite: ECCE 354; ECCE 356

Characterization of distributed systems. Software layers, models of distribution, inter-process communication, client-server. Middleware, remote procedure calls, interface specification languages, remote method invocation. Distributed object-based systems. Operating systems support, multiprocessing vs. multithreading, load sharing, synchronization. Distributed File and name services. Fault tolerance. Security requirements and mechanisms.

ECCE 444**Computer Security (2-2-3)**

Prerequisite: ECCE 354

Introduction to computer security. Fundamentals of cryptography: Substitution ciphers, hashing, symmetric and asymmetric crypto. Program Security: detect and exploit vulnerabilities in programs. Web vulnerabilities: SQL injection, cross site scripting. Identification and Authentication: Username and passwords, spoofing attack, password cracking. Access control: access control matrix and list, role based access control, multi-level security, access control in operating system such as Linux. Malware and Malware detection. Emerging threats: overview of other threats.

ECCE 446**Network Security (3-0-3)**

Prerequisite: ECCE 356

Modern network security vulnerabilities, threats, and attacks. Penetration testing and network scanning. Digital signatures, certificates, and PKI. Entity authentication and Kerberos. Network security protocols: SSL, TLS, IPSec. Network Firewalls, IDS/IPS, and Honeynets. Wireless security.

ECCE 448**Cloud Infrastructure and Services (3-0-3)**

Pre-requisite: ECCE 354; ECCE 356

Cloud Computing: history, computing paradigms, business drivers, drawbacks. Classic Data Center (CDC) vs. Virtualized Data Center (VDC). Cloud services models, deployment models, and economics. Amazon Elastic Compute Cloud (EC2). Cloud Infrastructure and Management. Virtualization: compute, storage, networking, desktop and applications. Business Continuity in VDC. Cloud Migration strategies and factors. Cloud Security: concerns and countermeasures, access control and identity management, and best practices.

ECCE 450**Embedded Systems (3-0-3)**

Prerequisite: ECCE 316

Introduce the main hardware and software elements of an embedded system. Fundamental concepts and design techniques of embedded systems. Architecture and programming of embedded processors. Basic services provided by real-time operating system ("RTOS") kernels. Design and development of multitasking code and application software. Interfacing, device drivers and input/output devices. Applications of embedded systems in consumer electronics, mobile, automotive, aerospace, digital control and other real time systems.

ECCE 454**Artificial Intelligence (3-0-3)**

Prerequisite: ECCE 342

This course covers the fundamental aspects of classic and modern Artificial Intelligence. Topics include: AI History, solving problems by searching, knowledge representation and reasoning techniques, agents, machine learning, evolutionary computation and fuzzy logic.

ECCE 456**Image Processing and Analysis (3-0-3)**

Prerequisite: ECCE 302 or BMED 352

Digital Image Processing Fundamentals, Human Visual Perception, Digital Image Acquisition Pipeline, Monochrome and Color Images, Color Spaces, Intensity Transformation, Histogram Equalization, Color Enhancement, Image Interpolation, Image Assessment techniques, Frequency Domain Representation, 2D Filters, Smoothing and Sharpening Filters, Filtering in the Spatial and Frequency Domains, Noise Reduction and Restoration, Image Segmentation, Image Compression.

ECCE 460**Wireless Communications (3-0-3)**

Prerequisites: ECCE 360

Overview of Wireless Communications Including Standards. Characterization of Wireless Channels. Bandpass Transmission Techniques for Wireless Communications. Receiver architecture and performance over Fading Channels and Diversity Techniques. Fundamentals of Cellular Communications. Orthogonal Frequency Division Multiplexing.

ECCE 461**Advanced Digital Communications (3-0-3)**

Prerequisites: ECCE 360

Spread spectrum techniques: Direct sequence (DS) and frequency hopping (FH). Multi user communications: Code division multiple access (CDMA), time division multiple access (TDMA), spatial division multiple access (SDMA), random access techniques (ALOHA), carrier sense multiple access (CSMA). Synchronization: time, frequency, phase, frame, network. Channel estimation and equalization techniques. Adaptive communications: Adaptive power, modulation and coding, resource allocation.

ECCE 462**Communication Systems Design and Prototyping (2-3-3)**

Prerequisite: ECCE 362

Overview of system design and prototyping techniques. Using computer simulation (Simulink/Matlab, LabVIEW) to design and evaluate the performance of communication systems. Overview of hardware prototyping using SDR and FPGA. Transmitter/receiver design, simulation and implementation: modulation, pulse shaping, RF up-conversion, RF down-conversion, sampling, matched filtering, channel estimation, synchronization, detection.

ECCE 463**Information and Coding Theory (3-0-3)**

Prerequisite: ECCE 362

History of information theory, information measure, entropy, information rate, memory less sources, sources with memory, information transmission on discrete channels (mutual information, discrete channel capacity), continuous channel, channel capacity, Shannon theory, coding applications (Huffman coding), Channel coding Techniques: Block and convolution codes, interleaving, puncturing, the bandwidth efficiency plane, the error probability planes.

ECCE 470**Antennas and Propagation (3-0-3)**

Prerequisite: ECCE 320

Antenna fundamentals, Radiation from a short current dipole, far field approximation, Radiation pattern, Radiation resistance. Radiation integral approach, dipole and monopole antennas, Image techniques, Antenna arrays, Broadside and end-fire arrays, Pattern multiplication, Pattern synthesis, Binomial and Chebyshev arrays, Aperture antennas, Fourier-transform method, Field equivalence principle, Sky-wave and space-wave propagation, Evolving antenna technologies and applications; fundamental design concepts of reconfigurable and conformal antennas, UWB MIMO antennas, antennas for: cognitive radio, propagation at THz and mm-wave, antennas for nano-communications, and biomedical applications

ECCE 472**Optical Communications and Networks (3-0-3)**

Prerequisite: ECCE 320

Elements of optical communication systems; Optical fibers, Step-index and graded-index fibers, Single-mode and multi-mode fibers, Fiber attenuation and dispersion, Optical sources and transmitters, Light-emitting diodes, Semiconductor laser diodes, Optical detectors and receivers, Photodiodes, Optical system design, Types of noises and system impairments, Power budget, Power penalty; Dispersion compensation, Optical communication networks

ECCE 481**Wireless Sensor Networks and Internet of Things (2-3-3)**

Prerequisite: ECCE 360; ECCE 316

Wireless sensor networks (WSN), sensor nodes, sensor network applications, design challenges, performance metrics, medium access control, data routing, sensor localization, time synchronization, energy constraints, power management, Internet of Things (IoT), Arduino, XBee, Raspberry Pi.

ECCE 484**Satellite and Space Communications (3-0-3)**

Prerequisite: ECCE 360

Overview of Satellite Services, Orbital Mechanics, transmission losses, the link budget power equation, system noise, carrier to noise ratio, the uplink, the downlink, the combined uplink and downlink carrier to noise, possible modes of interference, interference between the different satellite circuits, Satellite Access Techniques, Direct Broadcast Satellite Services, VSAT.

ECCE 491**Independent Study II (Variable course credits from 1 to 3)**

Prerequisite: Approval of department and senior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

ECCE 495**Special Topics in Electrical and Computer Engineering**

Prerequisite: Topic specific

This course mainly deals with new trends in Electrical/ Computer Engineering and emerging technologies. Course is repeatable if title and content differ.

ECCE 497**Senior Design Project I (1-6-3)**

Prerequisites: ECCE 312, ECCE 316, or approval of department

Students will pursue an in-depth project of significance in communication engineering by going from concept to working prototype. Some of the proposed design projects may involve interaction with industry. The students normally work in teams under faculty supervision. The project fosters teamwork between group members and allows students to develop their project management, technical writing, and technical presentation skills. Formal interim and final reports and presentations are required from each group.

ECCE 498**Senior Design Project II (0-9-3)**

Prerequisite: ECCE 497

Continuation of ECCE 497.

ENGR ENGINEERING**ENGR 111****Engineering Design (2-4-4)**

Prerequisite: None

This course exposes freshman engineering students to the breadth of engineering disciplines and introduces them to the fundamentals of the engineering design process under the concept of collaborative project-based learning. Solutions to engineering problems are developed through a process that has a number of phases, starting with problem statement and culminating in feasible conceptual design, leading to the actual design of the best design alternative. The latter transforms the abstract ideas to physical and tangible components, subsystems and holistic systems, analyzing and testing the embodied design to ensure the provision of the optimum outcome from the adopted solution. The course also addresses the social and environmental aspects of engineering design and engineering ethics.

ENGR 112**Introduction to Computing using C++ (3-1-2-4)**

Prerequisite: None

Introduction to computer systems. Overview of programming environments. Imperative programming: data types, conditional expressions and statements, repetitive structures, arithmetic and logic operators, functions, arrays, strings, structures, files.

ENGR 113**Introduction to Computing using Matlab (3-1-2-4)**

Prerequisite: None

Introduction to computer systems. Overview of programming principles using MATLAB. Overview of programming environments. Imperative programming: data types, conditional expressions and statements, repetitive structures, arithmetic and logic operators, scripts, functions, arrays, strings, structures. Input/ Output and files.

ENGR 295**Special Topics in Engineering**

Prerequisite: Sophomore Standing and Topic specific

This course mainly deals with new trends in Engineering and emerging technologies. Course is repeatable if title and content differ.

ENGR 296**Directed Study (1 to 3 credits)**

Prerequisite: Approval of academic advisor and department chair.

Directed study gives students the opportunity to explore an area of interest without having extensive knowledge or experience in the subject area or field of study. As a result, faculty direction and guidance are critical. A formal written report is usually required.

ENGR 311**Innovation and Entrepreneurship in Engineering Design (2-4-4)**

Prerequisite: ENGR 111, Junior Standing

The goal of the course is to equip the next generation of leaders with an innovative and entrepreneurial mindset and its related core skills. The course is composed of three modules: the Design Thinking Process; Entrepreneurship; and Growth and Leadership. The course introduces students to the principles and practice of innovation and entrepreneurship in engineering design, as well as the techniques that managers and entrepreneurs use to manage innovation effectively. The course uses a hands-on approach to engage students in the full process of innovation and entrepreneurship using the design thinking approach and includes the development of a prototype/simulation of the proposed solution and a business model canvas.

ENGR 395**Leading Innovation in Technology, Organizations & Society (3-0-3)**

Prerequisite: ENGR 311

Driven by accelerating innovation, the only constant is change: This course examines innovation in a selection of recent technologies and their impact on organizations as well as society as a whole to produce change, and how that change can be best managed. This includes social, commercial, environmental, economic and ethical analyses to deal with increasing technological complexity and human sophistication.

ENGR 399**Engineering Internship (0-0-1)**

Prerequisites: 75 credits by end of fall semester, of which, 15 credits earned in Major

Students are required to spend a minimum of 8 continuous weeks on an approved internship program. The internship provides students with practical, on-the-job experience which allows them to integrate theory with "real world" situations. It is academically supervised by a faculty member and professionally supervised by the company's internship supervisor who provides feedback to

the university about the student's progress. A formal report, that documents the work undertaken during the internship period, must be submitted to the Department within the first two weeks of the semester following the internship. The report and the complete course activities are graded on Pass/Fail basis by a faculty member.

ENGR 455**Finite Element Analysis (3-0-3)**

Prerequisite: MATH 204; MATH 206; AERO/CIVE/MEEN 200

An introduction to the basic theory of finite element analysis (FEA) with emphasis on stress analysis of trusses, beams, frames, 2D and axisymmetric structures; integration of the FE method into thermal analysis; assessment of the accuracy of FE predictions; computational exercises using commercially available FE software.

ISYE INDUSTRIAL AND SYSTEMS ENGINEERING**ISYE 200****Engineering Economic Analysis (3-0-3)**

Prerequisite: BUSS 201

This course will introduce economic analysis for the comparison of engineering alternatives to make informed financial decisions. Topics include time value of money, present-worth analysis, annual equivalence analysis, rate-of-return analysis, and methods to address project uncertainty.

ISYE 201**Introduction to Industrial & Systems Engineering (3-0-3)**

Prerequisites: MATH 112; ENGR 112

This course provides an introduction and overview of various domains in industrial & systems engineering. Students will become familiar with common IE applications including planning & control in manufacturing, operations research, simulation, quality, ergonomics, engineering economics, supply chains and Systems engineering terms, standards, and procedures and acquire knowledge and skills necessary to engineer complex, multi-disciplinary systems.

ISYE 251
Operations Research I (3-3-4)

Prerequisite: MATH 204

This course introduces Operations Research and deterministic mathematical modeling with emphasis on linear programming. Topics include mathematical modeling of industrial problems, graphical interpretation, simplex method, duality and sensitivity analysis; general solution strategies; and utilization of modeling languages and solvers for computer solution.

ISYE 271
Modern Methods of Manufacturing (3-3-4)

Prerequisite: ENGR 112; PHYS 121

This course introduces modern methods of manufacturing with emphasis on processes and techniques such as digital and additive manufacturing to address the interaction of design, materials, energy, and processing. Laboratory instruction and hands-on experience in machining, process planning, economic justification, and current manufacturing methodologies.

ISYE 311
Quality Control & Reliability (3-3-4)

Prerequisite: MATH 242

This course will introduce theory and methods of quality control, system level reliability and maintenance engineering. Topics covered include process capability indices, attributes and variables control charts, time weighted control charts (CUSUM and EWMA), process and improvement with design of experiments, system reliability, availability, maintenance.

ISYE 331
Stochastic Processes (3-0-3)

Prerequisite: MATH 204; MATH 206

To learn techniques for modeling stochastic systems, introduce methods for using stochastic models in solving engineering design problems. Analyze probability models that capture short and long term effects of randomness on the systems using a broad range of mathematical and computational tools. Applications such as

inventory, reliability, queuing models, and service systems will be discussed.

ISYE 341
Simulation Modeling and Analysis (3-3-4)

Prerequisites: ENGR 112; ISYE 331

Discrete event simulation methodology emphasizing the statistical basis for simulation modeling and analysis. Overview of computer languages and simulation design. Applications include a variety of industrial situations, including manufacturing and logistics simulations.

ISYE 351
Production, Operations and Inventory Management (3-0-3)

Prerequisite: MATH 242; ISYE 251

This course introduces students to concepts of operations management in manufacturing and non-manufacturing sectors. The course analyzes the interrelationships among the component blocks of the system: forecasting, inventory models, aggregate planning, production scheduling, material and capacity planning, and operations scheduling. The course also includes an overview of integrated production planning and control including MRP II.

ISYE 352
Lean Manufacturing (3-0-3)

Prerequisite: ISYE 271 or MECH 270

This course will introduce students to lean philosophy and tools, and will teach students how to design lean manufacturing systems. It will identify differences between push and pull type manufacturing systems. While the course primarily focuses on manufacturing systems it will also provide basic knowledge needed to design lean service systems.

ISYE 360
Human Factors & Safety Engineering (3-3-4)

Prerequisite: ISYE 201

An introduction to human capabilities and their limitations in engineered systems to increase productivity and work safely. Topics include the range of human motions, senses, and cognitive abilities; the incorporation of the human element into system and product design; communicating critical information to human users; ergonomics and safety in workplace design; safety in workplace.

ISYE 361
Data and Information Engineering (3-0-3)

Prerequisite: ISYE 201

This course introduces data modeling and the design and implementation of databases to extract and represent information for various industry applications. Topics include relational models and normalization, entity-relationship models, manipulation of data using Structured Query Language, data visualization and analysis tools, and retrieving data from external sources such as ERP systems and data warehouses.

ISYE 362
Systems Project Management (3-0-3)

Prerequisite: BUSS 201

This course presents a systems approach to managing engineering projects. The course objectives includes: gain understanding of essential principles associated with effective project management, application of systems engineering and leadership principles in the day-to-day business environment, acquire skills in defining, planning, initiating and monitoring systems based engineering projects using proven techniques and commonly available computer software tools.

ISYE 391
Independent Study I (Variable course credits from 1 to 3)

Prerequisites: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

ISYE 401
Advanced Systems Engineering (3-0-3)

Prerequisite: ISYE 201

This course introduces advanced level to systems methodology, design, and management, an overview of systems engineering as a professional and intellectual discipline, and its relation to other disciplines, such as operations research, management science, and economics.

ISYE 422
Reliability (3-0-3)

Prerequisite: ISYE 311

To understand and learn system level reliability and maintenance engineering, specific topics include hazard functions, life distributions, censoring, life tables, nonparametric and parametric estimation and inference, accelerated life testing, structure functions, reliability and maintenance systems, replacement theory.

ISYE 430
Supply Chain and Logistics (3-3-4)

Prerequisites: ISYE 351

This course introduces supply chain and logistics concepts integrating theory and methods developed in courses such as production, operations and inventory management and Operations Research. The course emphasis is on understanding the role of supply chains for competitive advantage, when and how these concepts are applied to improve the distribution of goods and services, as well as on using mathematical programming and optimization methods for their adequate implementation.

ISYE 431**Time Series Forecasting (3-0-3)**

Prerequisites: MATH 242

The objective of this course is to teach the students how to model and forecast time series data, using specialized statistical techniques and software. The emphasis will be on the time domain. Topics include: stationarity, time series specification, decomposition and the Box-Jenkins methods, ARMA/ ARIMA, SARIMA models, model estimation, multi-step ahead forecast and forecast error.. This course will provide students with hands-on experience in techniques for modeling and prediction of time series.

ISYE 432**Advanced Stochastic Processes (3-0-3)**

Prerequisite: ISYE 331

This course covers the analysis and modeling of stochastic processes. Topics include measure theoretic probability, martingales, renewal theory, elements of large deviations theory, Brownian motion, stochastic integration and Ito calculus and functional limit theorems. In addition, the course will go over some applications to finance engineering, insurance, queuing and inventory models.

ISYE 433**Advanced Statistics (3-0-3)**

Prerequisite: MATH 242

This course introduces Advanced Inferential Statistics and the conceptual underpinnings of statistical methods and how to apply them to address more advanced problems. Topics covered includes design of experiments, nonparametric statistics, and Bayesian statistics. Learning how to effectively use data and use of statistics-oriented programming language such as R or SAS.

ISYE 441**Advanced Simulation (3-0-3)**

Prerequisite: ISYE 341

This course provides an advanced treatment of simulation topics focusing on agent-based simulation models and analysis techniques.

Topics include large-scale and complex industrial systems; input modeling, output analysis, sensitivity analysis, design of experiments (Taguchi methods), comparison of alternative system configurations.

ISYE 445**Six-Sigma Methodology & Applications (3-0-3)**

Prerequisite: MATH 242

This course introduces the concept, deployment and practice of Six-Sigma, Six-Sigma methodologies for process improvement and process/product design including: DMAIC and DMADV methods; overview of different quality management tools applied in Six-Sigma projects; Six-Sigma project management and applications of Six-Sigma tools in real world projects.

ISYE 451**Operations Research II (3-0-3)**

Prerequisite: ISYE 251

This course will introduce a variety of optimization problems with integer variables and constraints. Topics covered include assignment problems, transportation, transshipment problems, network flows problems, and IP algorithms such as Cutting Planes, Branch & Bound. Applications include the Knapsack Problem and the Traveling Salesman Problem. Appropriate Optimization software tools will be used to solve a variety of practical problems.

ISYE 461**Design of Human-Integrated Systems (3-0-3)**

Prerequisites: MATH 242

Introduction to the effective design of information technology to support human activity in the workplace. Topics include general cognitive systems engineering concepts and principles and specific concepts and principles of interface design, task analysis, prototyping, and empirical usability evaluation methods. Case studies and individual and group design projects help students apply the concepts and principles in domains such as service, management, manufacturing, transportation and control systems.

ISYE 475**Facilities Planning and Warehousing (3-3-4)**

Prerequisites: ISYE 352

Design of facilities for the most efficient flow and storage of raw materials, work-in-process, and completed stock through a work place. Topics include facilities layout planning models, space-activity relationships, materials handling, storage, and warehousing in relation to trends toward reduced inventory, smaller lot sizes, and just-in-time production using current modeling and analysis tools.

ISYE 480**Financial Engineering (3-0-3)**

Prerequisites: MATH 242; ISYE 251

This is an introductory course on financial engineering, technical difficulty of the subject is kept at a minimum, while the major ideas and concepts underlying modern financial engineering are explained and illustrated. Students will learn about the different types of interest, annuities, debt retirement methods, investing in stocks and bonds. The course covers the binomial model for stock prices, portfolio management, and an elementary introduction to continuous time models and the Black-Scholes formula.

ISYE 481**Procurement and Supply Management (3-0-3)**

Prerequisite: ISYE 351

Procurement supplies the organization with a flow of materials and services that ensure continuity of supply by maintaining effective relationships with existing sources and by developing other sources of supply either as alternatives or to meet emerging or planned needs. Topics include sourcing strategies, outsourcing, pricing and total cost of ownership.

ISYE 485**Stochastic Manufacturing And Service Systems (3-0-3)**

Prerequisite: ISYE 331

Models for describing stochastic movements of parts and material in manufacturing facilities,

supply chains, inventory systems, and equipment maintenance networks. Analysis of congestion, delays, machine usage, line balancing, equipment availability, inventory ordering policies, and system crashes. Basics of Markov Chains and queuing theory.

ISYE 491**Independent Study II (Variable course credits from 1 to 3)**

Prerequisites: Approval of department and senior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

ISYE 495**Special Topics in Industrial Engineering (3-0-3)**

Prerequisites: Senior standing and approval of the department

This course gives an undergraduate student the opportunity to participate in an individual or group oriented project, study and/or research study under direction of a faculty member. A formal report is required.

ISYE 497**Senior Design Project (1-6-3)**

Prerequisites: ISYE 311; ISYE 341

Participation in team projects dealing with design and development of a product or a system. Number of project will be offered each year by the different departments, some of which will have a multi-disciplinary nature. This will be an opportunity to exercise initiative, engineering judgment, self-reliance and creativity, in a team environment similar to industry. The design projects require students to draw upon their engineering background, experience, and other pertinent resources. Oral and written presentations are required.

ISYE 498**Senior Design Project II (0-9-3)**

Prerequisite: ISYE 497

Continuation of ISYE 497.

MEEN MECHANICAL ENGINEERING**MEEN 180****Computer Aided Design (2-3-3)**

Prerequisite: None

This course introduces students to key concepts, techniques and applications of a Computer Aided Design (CAD) 3D Solid Modeling. Course emphasizes graphics communication and its role in engineering design. Topics include projections and visualization, 3-D computer modeling, building computer assembly models, multiviews, section views, dimensioning, tolerancing and engineering drawings.

MEEN 200**Statics (3-0-3)**

*(Cross listed with AERO 200; MEEN 200)

Prerequisite: PHYS 121

A vector treatment of force systems and their resultants: equilibrium of trusses, beams, frames, and machines, including internal forces and three-dimensional configurations, static friction, properties of areas, and distributed loads and hydrostatics.

MEEN 201**Engineering Dynamics (3-0-3)**

*(Cross listed with AERO 201; CIVE 201)

Prerequisite: MEEN 200

Co-requisites: MATH 204; MATH 206

This course introduces rectilinear and curvilinear motion of particles and rigid bodies, kinematics and kinetics of particles and rigid bodies, rotational and translational motion of rigid bodies, principle of work and energy, and principle of impulse and momentum in particles and rigid body dynamics.

MEEN 225**Engineering Materials (3-3-4)**

Prerequisites: CHEM 115; PHYS 121

This course introduces the three primary groups of engineering materials and the relationship between the structural elements of these materials and their properties. Atomic structure and inter-atomic bonding in metals, ceramics and polymers are discussed. Imperfections in crystal structure, diffusion, phase transformations, and microstructure are studied in relationship to material properties such as tensile strength, hardness, fatigue, and creep.

MEEN 240**Thermodynamics (3-0-3)**

Prerequisite: PHYS 121

This course introduces the concept of energy and the laws governing the transfer and transformations of energy. Emphasis on thermodynamic properties of pure substance, the first law analysis of closed and open systems, the concept of entropy, and the second law of thermodynamics. Application of the first and second law to the analysis of thermal systems is also covered.

MEEN 300**System Dynamics and Control (3-0-3)**

Prerequisite: MATH 211 or MATH 2016

Restrictions: Students majoring in Aerospace and Mechanical Engineering are not allowed to take this course

The contents include both dynamic modelling of mechanical and electromechanical systems, different types of controller designs and their practical applications. Review of kinematics and kinetics of particles; Kinematics and kinetics of plane motion of rigid bodies; Principles of feedback; Time domain specifications and stability analysis; PID controller design and PID tuning; Root Locus method.

MEEN 325**Mechanics of Solids (3-3-4)**

(Cross listed with AERO225 and CIVE 225)

Prerequisites: MEEN 200

The course is an introduction to the mechanics of deformable solids applied to basic engineering structures. It covers the concepts of stress and strain at a point; factor of safety in design, deformation of axially loaded members; symmetric and unsymmetric bending of elastic and elastic-perfectly plastic beams; torsion of open and closed section; beam deflection; stress and strain transformations, and elastic buckling of columns.

MEEN 335**Fluid Mechanics (3-3-4)**

Prerequisite: MATH 231

Co-requisite: MEEN 240

This course introduces students to concepts relating to fluids and examines the forces on them. Conservation of mass, momentum, and energy are introduced using differential and integral formulations. Introduce inviscid and viscous flows, laminar and turbulent flows and dimensional analysis. Calculations of pressure drop in internal flows and lift and drag forces over immersed bodies.

MEEN 343**Heat Transfer (3-3-4)**

Prerequisites: MATH 231; MEEN 240

Co-requisite: MEEN 335

This course focuses on the mechanisms of heat transfer: fundamental physical mechanisms and applications. Steady and transient conduction, Convective heat transfer and the Reynolds analogy, free and forced convection for laminar and turbulent flows, and heat exchangers are covered. Radiative heat transfer will also be introduced.

MEEN 350**Dynamic Systems and Vibration (3-0-3)**

Prerequisites: PHYS 122; MATH 206; MEEN 201

Mathematical modeling of mechanical, electrical, hydraulic, and/or thermal systems; basic concepts in dynamic systems analysis – equilibrium,

linearization; mechanical vibrations: free and forced vibration of single degree-of-freedom systems, transient and steady-state response, resonance, free vibration of two degree-of-freedom systems; transfer functions and block diagrams, design specifications based on step response, applications.

MEEN 356**Computer-Controlled Systems (3-3-4)**

Prerequisite: MEEN 350

This course introduces control of mechanical, electrical and electromechanical systems, feedback control in mechatronic systems, prototype systems, transient response analyses and servomechanism, root locus method, frequency response techniques, state-space representation. Controller specifications, design and architectures; PID and alternative controller design. Digital filters and principles of Digital Signal Processing, digital controllers. Data acquisition and real-time control, computer-aided control system design and simulation. Industrial control applications.

MEEN 360**Computational Methods for Mechanical Engineers (3-0-3)**

Pre-requisite: ENGR 113; MATH 204

Co-requisite: MATH 206

Understand the concept of numerical approximations and their application in solving mechanical engineering using MATLAB.

MEEN 370**Introduction to Manufacturing Processes (3-3-4)**

Co-requisite: MEEN 325

Introduction to basic manufacturing processes, including casting, forming, material removal and joining, plastics, powder metal, and ceramics production in addition to composite manufacturing. Additionally, design for manufacturability (DFM) and design for assembly (DFA) methodologies and tools are introduced.

MEEN 380
Introduction to Polymer Science and Engineering (3-0-3)

Prerequisites: CHEM 115; PHYS 122

This course introduces fundamentals, properties and applications of polymers. Classification of polymers, polymer formation, polymer structure, characterization, and the relationship between structure and properties are covered. Mechanical properties of polymers are discussed in relationship to their application as engineering materials. The influence of the various stages of polymer processing on properties of the end product is emphasized.

MEEN 387
Machine Element Design (2-3-3)

Prerequisites: MEEN 325

Design and analysis of machine components for load bearing and power transmission. Consideration of material failure modes. Design and selection of machine elements: shafts, rolling element bearings, bolts, belts, and power transmissions such as gears. Computer aided engineering (CAE) is also introduced in laboratory sessions.

MEEN 391
Independent Study I (Variable course credits from 1 to 3)

Prerequisite: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

MEEN 405
Vibration Analysis (3-0-3)

Prerequisite: MEEN 350

Free and forced vibrations of one and two degree-of-freedom systems. Vibration measurement and isolation. Numerical methods for multi-degree-of-freedom systems. Modal analysis techniques. Dynamic vibration absorbers. Shaft whirling.

Vibration of continuous systems: bars, plates, beams and shafts. Energy methods. Holzer method.

MEEN 410
Viscous and Boundary Layer Flows (3-0-3)

Prerequisite: MEEN 335

This course covers differential analysis of viscous fluid flow, exact solutions of the Navier-Stokes equations, laminar and turbulent boundary layers, Blasius and Von Karman integral solutions, the Polhausen method, and flow separation.

MEEN 420
Materials: Strength and Fracture (3-0-3)

Prerequisite: AERO/MEEN 220

The course is an introduction to the mechanics of fracture for engineering materials. It covers the analysis and prevention of failure in metals, polymers, ceramics and composites; plastic deformation and plastic collapse; initiation and propagation of cracks; environment-assisted cracking, and fatigue.

MEEN 421
Mechanics of Deformable Solids (3-0-3)

Prerequisite: MEEN 325

The course is an introduction to the theory of elasticity. It covers the concepts of deformation, stress and strain in a continuum; Formulation and solution strategy for boundary value problems in linear elasticity; Concepts of work and energy and the principle of virtual work; Problems in plane stress and plane strain in two-dimensional elasticity and solution using stress functions; Solutions to axial deformation, bending and torsion problems for elastic cylinders.

MEEN 422
Fatigue and Fracture Analysis (3-0-3)

Prerequisite: MEEN 325

The course is an introduction to elastic and elastic-plastic fracture mechanics and fatigue. It covers the topics of stress concentration due to defects, linear elastic fracture mechanics, energy methods in fracture mechanics, stress analysis of cracks and stress intensity, stress-life and strain-life methods of fatigue analysis and design, and initiation and propagation of fatigue cracks under cyclic loading.

MEEN 435
Turbomachinery (3-0-3)

Prerequisite: MEEN 335

This course covers the fundamentals of turbo machines analyses, velocity triangle method, similarity laws, performance characteristics, applications and selection of turbo machines for a variety of engineering situations such as pumping, gas compression and power production.

MEEN 439
Machine Dynamics (3-0-3)

Prerequisite: MEEN 201

This course introduces fundamentals of kinematics of linkages, cams, gears and gear trains. It also covers position, velocity, and acceleration analysis of machines, static and dynamic force analysis of mechanisms.

MEEN 441
Applied Thermodynamics (3-0-3)

Prerequisite: MEEN 240

This course introduces the concept of Exergy, application of the first and second law of Thermodynamics to gas and vapour power cycles, combined gas/vapour cycles, and cogeneration. Heat pump and refrigeration cycles: vapour compression cycles, absorption refrigeration and gas refrigeration. Mixtures of perfect gases and vapours, psychrometry, stoichiometry and combustion.

MEEN 446
Internal Combustion Engines (3-0-3)

Prerequisite: MEEN 240

The basic operating principles of internal combustion engines. Topics covered include: engine thermodynamics, thermochemistry and fuels, engine fluid mechanics and heat transfer and pollutant emissions. Problem analysis emphasizes propulsion and power-generation applications in mechanical engineering.

MEEN 450
Vehicle Engineering (3-0-3)

Prerequisites: MEEN 350

The course emphasizes the engineering and design principles of road transport vehicles. Topics to be covered include: performance characteristics, handling behaviour and ride quality of road vehicles.

MEEN 454
Refrigeration, Air Conditioning and Cryogenics (3-0-3)

Prerequisite: MEEN 343

This course covers psychometrics, air conditioning systems, advanced refrigeration cycles, heating and cooling loads, and principles of cryogenics.

MEEN 465
Bioengineering (3-0-3)

Prerequisite: MEEN 325

Co-requisite: MEEN 225

This is an introductory course to bioengineering. Basic mechanical description of the hierarchical structure of an organism: molecules, membranes, cells, tissues, skeleton, and locomotion, will be covered. Conservation of material, energy, charge and momentum in biological systems will also be covered.

MEEN 484**Mechatronics (2-3-3)**

Prerequisites: MEEN 350

Principles of mechatronic systems, modeling, time & frequency domain analysis. Electronic components in mechatronic systems. Sensors, actuators, microcomputers, programming. Signal measurement, A/D and D/A conversion, quantization, Laplace Transform techniques, time response analysis, block diagram representation, feedforward/feedback, steady-state and transient responses, basic control system analysis and PID controllers, digital controllers, feedback control in mechatronic systems. Mechatronic control system design and experiments.

MEEN 485**Introduction to Robotics (3-0-3)**

Prerequisite: MEEN 356

This course introduces fundamentals of robotics including kinematics, dynamics, and motion planning of an industrial arm robot. In kinematics, operations of rotation and translation, and the notion of homogeneous transformations are introduced. Forward kinematic equations of rigid manipulators and inverse kinematics are derived. Velocity relationships are determined with the use of the Jacobian matrix. Path planning and trajectory of motion are also discussed in this course. The course incorporates a semester long hands-on project.

MEEN 486**Sustainable Energy (2-3-3)**

Prerequisite: MEEN 240

The course provides introductory coverage of energy production, conversion, distribution and storage systems for different sources of energy including fossil fuel; nuclear power; biomass energy; geothermal energy; hydropower; wind energy, and solar energy. Emphasis is placed on the sustainable use of energy in light of economic, environmental, and societal constraints.

MEEN 491**Independent Study II (Variable course credits from 1 to 3)**

Prerequisites: Approval of department and senior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

MEEN 495**Special Topics in Mechanical Engineering (3-0-3)**

Prerequisites: Senior standing and approval of the department

This course gives an undergraduate student the opportunity to participate in an individual or group oriented project, study and/or research study under direction of a faculty member. A formal report is required.

MEEN 497**Senior Design Project I (1-6-3)**

Prerequisites: MEEN 343; MEEN 370; MEEN 387

Students participate in team projects that can be multidisciplinary in nature to design, build and test a product or a system. The design projects require students to draw upon their engineering background, experience, and other pertinent resources. Advanced topics are introduced to help students develop conceptual designs, justify and select an optimum solution, and develop and build a fully operational prototype. Topics covered include PDS, QFD, Pugh analysis, DfX, FMEA, feasibility and economics analysis, as well as contemporary issues including professional and ethical responsibilities, engineering solutions in a global, environmental and societal context. The project will conclude with an oral presentation and a written report.

MEEN 498**Senior Design Project II (0-9-3)**

Prerequisite: MEEN 497

Continuation of 497

NUCE NUCLEAR ENGINEERING**NUCE 301****Radiation Science and Health Physics (3-0-3)**

Prerequisites: PHYS 122; ((MATH 204 & MATH 206) (or NUCE 302))

This course provides students with an understanding of radiation science, including radiation shielding, as a foundation to understanding the theoretical and practical aspects of radiological protection and a working knowledge of radiation protection legislation. Topics covered include introduction to modern physics, radioactivity, nuclear reactions, and radiation interactions with matter, radiation detection, protection, dose, and legislation.

NUCE 302**Applied Mathematics for Nuclear Engineering (3-0-3)**

Prerequisites: MATH 112 or equivalent

This course recaps some of the undergraduate mathematics materials relevant to the advanced graduate courses. Furthermore, basic introductory material for the numerical analysis will be also provided to the students.

NUCE 303**Mechanics & Thermal-hydraulics Principles for Nuclear Engineering (3-0-3)**

Prerequisite: PHYS 121 or equivalent

This course provides students with a thorough understanding in mechanics of materials and thermal hydraulics related topics and concepts. The specific subjects are selected on the basis of their relevance and applicability to nuclear engineering technology.

NUCE 401**Introduction to Nuclear Reactor Physics (3-0-3)**

Co-requisite: NUCE 301 or equivalent

This course provides the students with the basic understanding of nuclear reactor physics. It also provides students with the fundamental principles and practical applications related to the utilization of nuclear energy from fission. It covers the concepts of neutron diffusion in one-group and multi-group contexts. It also gives a brief introduction to the subject of time-dependent nuclear reactor.

NUCE 402**Introduction to Nuclear Systems and Operation (3-0-3)**

Prerequisites: (MEEN 240 and MEEN 335) OR NUCE 303; NUCE 401

Note: Students can either take NUCE 402 or NUCE 403 but not both

This course provides students with an overview of nuclear systems and power plants, including operation steps, energy transport schemes, various power reactor types, safety principles, and control functions, as a foundation to understanding the theoretical and practical aspects of nuclear plant design and operation and a working knowledge of various safety features.

NUCE 403**Introduction to Nuclear Technology and Reactor Systems (3-0-3)**

Prerequisites: (MEEN 240 and MEEN 335) OR NUCE 303; NUCE 401

Note: Students can either take NUCE 402 or NUCE 403 but not both.

This course provides the students with a general description of nuclear energy systems including the performance and operation principles as well as methods for the design and critical analysis of these systems at TAMU, USA. Then, the course provides the students with more practical design of nuclear system and operation including design and functionality of major component in NPP and hands-on exercises of various NPP simulator at KU, UAE. The course includes Field Trips and visits to various Laboratories and Facilities.

PEEG PETROLEUM ENGINEERING**PEEG 218****Reservoir Rock Properties (2-3-3)**

Prerequisite: ENGR 111

Theoretical introduction to basic rock properties and their core-based measurements determined by conventional and special core analysis. It will be discussed how to obtain reliable core analysis data and the specific topics include porosity, permeability, Darcy's law with applications/limitations, saturations, wettability, capillary pressure, relative permeability, resistivity, compressibility and the effect of stresses on rock physical properties. Laboratory experiments will reinforce concepts discussed in the classroom.

PEEG 219**Reservoir Fluid Properties (2-3-3)**

Prerequisite: MEEN 240

The theoretical and laboratory parts of this course cover the basic characterization of reservoir fluids, their properties, their determination and their measurement. Topics covered include phase behaviour, density, saturation pressures, gas-oil ratios, shrinkage, oil and gas formation factors, viscosity and the compositional analysis of oil, gas, and brine.

PEEG 252**Mechanics of Materials for PE (3-0-3)**

Prerequisite: MATH 112; PHYS 121

Intro to Statics and Strength of Materials with emphasis on geomaterials. Forces, force couples, resultants, free body diagrams, equations of equilibrium and internal/external forces are introduced first and the applied to problems of stress analysis in structural members and rocks in axial and multiaxial loading. Stress tensor is introduced and the significance of elastic parameters is highlighted. Stress transformation equations, experimental methods of measuring rock strength, and failure criteria are also discussed.

PEEG 302**Fluid Mechanics and Heat Transfer (3-0-3)**

Prerequisite: MEEN 240

This course introduces the principles of momentum transfer and overall mass, energy and momentum balances including an introduction to multiphase flow in pipes. Topics also include the principles of steady-state and unsteady-state heat transfer. Specific applications such as measurement of fluid flow, pumps, gas-moving equipment, prediction of pressure drop in pipes, restrictions and manifold systems, heat exchangers, and thermal gradient and heat transfer in oil and gas wells are stressed.

PEEG 314**Well Logging (3-0-3)**

Prerequisite: PEEG 218, PHYS 122

Co-requisite: PEEG 322

This course provides an introduction to the various well logging methods, tools and their principles of operation with emphasis on the relationship between measurements and reservoir petrophysical properties. Conditions and limitations for applications of various logs are discussed. Graphical and analytical methods used to determine formation composition, contents, and its potential for production are developed and applied to create graphs and log traces, and determine reservoir parameters.

PEEG 315**Reservoir Characterization (2-3-3)**

Prerequisites: PEEG 219, PEEG 314, PEGE 311

Students learn how to integrate geological, geophysical, petrophysical and engineering data, using geostatistical tools and workflows, to characterize the reservoir and build a 3D static model, to be used in subsequent reservoir simulation studies. They will also learn how to use Petrel software to load, process, interpret and visualize the reservoir in three-dimensions and carry out uncertainty analysis on volumetrics using Monte Carlo simulation.

PEEG 322**Drilling Engineering I (2-3-3)**

Prerequisite: PEEG 252

Co-requisite: PEEG 314

This is an introductory level drilling course which introduces rotary drilling process and basic drilling rig components to the students who have no prior knowledge on oil well drilling technology. Hands on laboratory testing of drilling fluids will be covered. At the end of the course the students should be able to assess formation pressures and fracture strengths; design mud programs and casing shoe depths; design basic components of a drilling rig to meet a given and be familiar with popular drilling problems.

PEEG 326**Drilling Engineering II (2-3-3)**

Prerequisites: PEEG 322; PEEG 302

This is an advanced level drilling course designed for students who have prior knowledge of drilling fundamentals. The course covers a range of topics from casing and cementing technology, hydraulics, directional drilling, and well control. Upon completing this course, the students should be able to select casing grades for a given well data, formulate, design and analyze cementing operations as well as directional drilling data analysis. Hands on practical sessions on drilling simulators will be covered.

PEEG 331**Reservoir Engineering I (3-0-3)**

Prerequisite: PEEG 218; PEEG 219; PEEG 302

This course presents the students with the derivation and application of zero dimensions reservoir models for reservoir management and performance prediction. The subject of oil or gas initial and remaining reserve will be introduced, in relation with initial hydrocarbon in place through the concept of unit recovery, recovery efficiency and recovery factor. The course will also present the different types of hydrocarbon reservoirs, with its possible oil and gas drive mechanisms.

PEEG 334**Reservoir Engineering II (4-0-4)**

Prerequisite: PEEG 331; MATH 206

Key reservoir parameters required to calculate recovery factor, mobilization, sweep efficiencies, fractional flow analysis, and heterogeneity interaction and their influence on recovery factor are fully covered. General principles relating to SCAL properties and volumetric sweep that should be considered in planning secondary recovery, EOR and IOR processes are reviewed. Introduction to reservoir simulation principles is also discussed.

PEEG 341**Completion and Workover (3-0-3)**

Prerequisite: PEEG 322

The course presents a review of well completion and workover techniques. The well completions for different field conditions are discussed including technical and economic considerations. The design of the tubing string, the most important downhole equipment of any well, is discussed. The ways of opening the formation for production are detailed with types of perforation technique. Workover procedures including remedial cementing, well stimulation methods are studied with required design procedures.

PEEG 391**Independent Study I (Variable course credits from 1 to 3)**

Prerequisite: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

PEEG 394
Research Topics in Petroleum Engineering
(Credits vary from 1-3)

Prerequisite: Junior standing and approval of the department

The course focuses on research-driven topics. A student can take multiple Research Topics courses with different content for credit subject to program approval.

PEEG 395
Special Topics in Petroleum Engineering (Credits vary from 1-3)

Prerequisites: Junior standing and approval of the department

This course gives an undergraduate student the opportunity to participate in an individual or group oriented project, study and/or research study under direction of a faculty member. A formal report is required.

PEEG 420
Well Treatment (3-0-3)

Prerequisites: PEEG 341; Senior year standing in PE

This course is designed impart knowledge on production impairment and methods of improving well productivity. Topics include understanding the impairment mechanism and treatment methodologies relating to formation damage, excess water and gas production, asphaltene, wax and inorganic solid deposition applying mechanical devices and chemical treatments. Problem diagnosis, selection of chemicals and hardware and designing specific well treatment job will also be covered.

PEEG 423
Horizontal and Multilateral Well Technology (3-0-3)

Prerequisite: PEEG 326

This is a comprehensive course designed to familiarize petroleum-engineering students with the benefits and design of horizontal and multilateral wells. The topics covered include key details of drilling and completion of horizontal and multilateral wells, such as planning, drilling,

surveying, tubular selection, failure analysis, cutting transport, hole-stability, cementing, centralizer spacing, etc. Students work on design examples and utilize an industry software package.

PEEG 424
Underbalanced Drilling Technology (3-0-3)

Prerequisite: PEEG 326

This course is designed to familiarize students with the five popular UBD techniques. These are Air/ Natural Gas Drilling, Mist Drilling, Foam Drilling, Gasified Liquid Drilling and Flow Drilling. Benefits and limitations of each technique along with the design principles and operational procedures are discussed. Common problems pertinent to each technique and recommended procedures are also discussed.

PEEG 425
Pressure Control (3-0-3)

Prerequisite: PEEG 326

This course is designed to introduce fundamental well control principles, procedures and control equipment to the students who have completed their basic drilling engineering courses. Students will learn concepts of formation pressure, static and dynamic well bore pressures; primary and secondary well control, shut in procedures; kick circulation procedures; well control equipment and alleviate kick circulation problems. Students will also have hands on training and an IWCF-type practical exam on the PI Drilling Simulators.

PEEG 436
Well Testing (3-0-3)

Prerequisites: PEEG 331, PEEG 314, MATH 206

This course covers theoretical development of flow equations governing well testing in oil and gas wells. Line source analytical solutions of flow equations will be covered concentrating on semi-log analysis. The principle of superposition will also be discussed. Production capacity of a well and pressure derivative analysis will be introduced.

PEEG 437
Natural Gas Engineering (3-0-3)

Prerequisite: PEEG 331

This course covers gas reservoirs rock and fluid Properties, including Darcy and non-Darcy flow phenomena near gas wells. Gas reserves estimation using linearized MBE and Decline Curve Analysis will be evaluated. Gas flow and gas well testing to evaluate reservoir characteristics will be covered. Deliverability of gas wells will be determined using Multi-Rate draw down testing, flow after flow testing, Isochronal Testing, and Modified Isochronal Testing.

PEEG 442
Production Facilities (3-0-3)

Prerequisite: PEEG 302

Co-requisite: PEEG 443

This course covers the description, applications, design, analysis and operational problems of surface production facilities. Topics include 2-phase and 3-phase separation, emulsion treatment, desalting, oil stabilization, water treatment, gas dehydration and sweetening, and storage and transportation (pipeline). Principles governing the flow of oil, gas, and water in the surface production system will be covered. Surface production problems (corrosion and environmental) and safety issues are also covered.

PEEG 443
Production System Design and Analysis (3-0-3)

Prerequisites: PEEG 331, PEEG 341

This course utilizes Nodal Analysis techniques for the design and performance analysis of the production system starting from the formation up to the production separator. Topics include inflow performance relationships, multiphase flow in horizontal, vertical and inclined pipes, overall well performance evaluation considering various nodes within the production system, and applications to design and analysis situations. Artificial lift techniques of gas lift and electrical submersible pump are studied.

PEEG 445
Production Enhancement (3-0-3)

Prerequisites: PEEG 341, PEEG 443

This course discusses the causes of production impairment and methods of improving productivity. Topics include loss of productivity due to formation damage, solids deposition, excessive water and gas production, and bottlenecks in the production system; and production enhancement by matrix treatments, remedial cementing and production profile control. De-bottlenecking of the production system through Nodal analysis of the production system is also covered.

PEEG 456
Petroleum Related Rock Mechanics (3-0-3)

Prerequisites: PEEG 252

Rock mechanics principles and topics such as nature of rock, rock deformability and rock stress, engineering properties of rocks from laboratory testing, and the effect of factors such as pore pressure, temperature and time on rock behavior are covered. Rock strength and failure and mathematical approaches to stress-strain analysis in rocks will be discussed together with applications such as borehole stability analysis and reservoir compaction.

PEEG 460
Petroleum Economics & Risk Analysis (4-0-4)

Prerequisite: BUSS 150

The objective is to develop students' expertise in the area of economics and risk/uncertainty analysis and their relation to decision making processes in the petroleum industry. It introduces students to the concept of business economics implemented in the modern petroleum industry. This approach improves students' skills in utilizing all available information about the project and related economic influences in depicting a realistic projection of the project worth and the chances of business success.

PEEG 491**Independent Study I (Variable course credits from 1 to 3)**

Prerequisite: Approval of department and junior standing

This course gives an upper level undergraduate student the opportunity to participate in an individual or group project, study, or research activity under the supervision of a faculty member. A formal report is required.

PEEG 494**Research Topics in Petroleum Engineering (Credits vary from 1-3)**

Prerequisite: Senior standing and approval of the department

The course focuses on research-driven topics. A student can take multiple Research Topics courses with different content for credit subject to program approval.

PEEG 495**Special Topics in Petroleum Engineering (Credits vary from 1-3)**

Prerequisites: Senior standing and approval of the department

This course gives an undergraduate student the opportunity to participate in an individual or group oriented project, study and/or research study under direction of a faculty member. A formal report is required.

PEEG 497**Senior Design Project I (3-0-3)**

Prerequisites: Senior standing; PEEG 322; PEEG 331; PEEG 315

Capstone design in Petroleum engineering is team-based design projects involving Exploration and/or Appraisal, Development (Production), Reservoir Management, Well drilling, Oil recovery or related design. Students participate in a design process that incorporates realistic engineering constraints such as applicability in the oil field and economics, as well as topics addressing safety and ethics.

PEEG 498**Senior Design Project II (3-0-3)**

Prerequisite: PEEG 497

Continuation of 497





COLLEGE OF ART AND SCIENCES FACULTY LISTING

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Associate Professor of Physics.

Abdeljabbar, Alrazi,

PhD University of South Florida, USA, 2012.
Assistant Professor of Mathematics.

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PhD University of Claude Bernard Lyon 1, France, 2011.
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Al Hanai, Mariam,

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Alifu, Alip Mohamed,

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Anderson, Alliya,

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Archbold, Ricardo,

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Ayish, Nader,

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Bennell, Robert,

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Bildsten, Meriem,

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Blouin, Denis,

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Bradley, Curtis,

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Bruno, Pier Paolo,

PhD University "Federico II" Naples, Italy, 1997. Associate Professor of Earth Sciences.

Bsoul, Labeeb,

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Cannon, Brendon,

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Carbonell, Curtis,

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Cavalcanti, Ellie,

MA University of Brighton, 1996. Senior Lecturer in English.

Ceriani, Andrea,

PhD University of Pavia, Italy, 2000. Associate Professor of Earth Sciences, and Chair of Earth Sciences.

Clark, John,

MSc Curtin University of Technology, Australia, 2002. Lecturer in Mathematics.

Craig, Robert,

MA University of Essex, UK, 1987. Senior Lecturer in English.

| D**Dalton, David,**

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Dean, Kevin,

PhD King's College, UK, 1981. Associate Professor of Physics.

Deveci, Tanju,

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Dib, Khalid,

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Didenko, Andriy,

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Dimmitt, Nicholas,

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Elbassioni, Khaled,

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El Gamal, Glenda,

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MEE University of Arkansas, USA, 1998; M.S. Delaware State University, USA, 1994. Senior Lecturer in Physics.

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El-Kork, Nayla,

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El-Sokkary, Wael,

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Fernandes, Ryan,

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Hall, Katherine,

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Hasheem, Nabee,

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Hassan, Jamal,

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Hatakka, Mary,

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Hayman, Mark,

PhD University of Warwick, 2000. Assistant Professor of Humanities and Social Sciences, and Associate Chair of Humanities and Social Sciences.

Henschel, Andreas,

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Hjouj, Fawaz,

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Kokkalas, Sotirios,

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Kucukalic, Lejla,

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PhD University of Manchester (UMIST), UK, 2002. Joint Professor of Computer Science and Electrical and Computer Engineering and Chair of Computer Science.

Lim, Hwee Ling,

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Midraj, Jessica,

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Miller, Gary,

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Mohamed, Sharmarke,

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Mohjazi, Lina,

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COLLEGE OF ENGINEERING FACULTY LISTING

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Ait Abderrahmane,

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Banat, Fawzi,

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Barkat, Braham,

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Barsoum, Imad,

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Beeley, Philip,

PhD, McGill University, Canada, 1981; Professor of Practice and Chair of Nuclear Engineering

Beig, Abdul Rahman,

PhD, Indian Institute of Science, Bangalore, 2004; Associate Professor in Electrical Engineering.

Belhaj, Hadi,

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Berrouk, Abdallah Sofiane,

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Boiko, Igor, DSc,

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Cantwell, Wesley,

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Chan, Vincent,

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