



ACADEMIC YEAR 2025/2026

COLLEGE CATALOG

COLLEGE OF ENGINEERING

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1

COLLEGE OF ENGINEERING





1.1 Dean's Message

In the name of Allah, Most Gracious, Most Merciful.

It is my great pleasure to welcome you to the College of Engineering annual report hoping you will find it informative.

In the College, we are striving to achieve our vision of being an outstanding educational and research college serving the needs of Oman and addressing the challenges faced by the society.

The College of Engineering at Sultan Qaboos University is among the first-ranked Engineering Colleges in GCC and the best Engineering College in Oman. It offers eight internationally accredited undergraduate engineering programs and at the postgraduate level, it offers fourteen MSc and six PhD programs. We are committed to maintaining and enhancing high quality programs by conducting a periodic review of all our academic programs. Since its inception in 1986, the College has employed an effective quality control policy for all offered programs. It gives us pride to be recognized by ABET, the Accreditation Board for Engineering and Technology. ABET is the primary organization responsible for monitoring, evaluating, and certifying the quality of applied science, engineering, and engineering technology education in the United States and overseas. The eight academic programs of the College of Engineering got officially a full accreditation for the second time by the Engineering Accreditation Commission (EAC) of ABET in 2014, and renewed in 2019. These programs are: Civil Engineering, Architectural Engineering, Electrical & Computer Engineering, Mechanical Engineering, Industrial Engineering, Petroleum & Natural Gas Engineering, Chemical & Process Engineering, and Mechatronics Engineering.

The scholarly works of our faculty are published in high impact factor journals and international refereed conferences, and as book chapters or books. The shift towards postgraduate studies and research, without compromising the quality of undergraduate education, has resulted in up-ward trends in publications, research grants, consultancies and international collaborations. Our strong relationship with the industrial and governmental sectors resulted in having the highest level of externally funded research projects and consultancies within the University. Our faculty members are actively involved in various national committees, which provide an excellent opportunity for exchange of ideas and expose them to the local needs and challenges.

The College is also very active in offering short courses, workshops and seminars, which provides ample avenues to disseminate engineering knowledge to the local, regional and international community. Furthermore, the College organizes international conferences in various engineering fields, which attracts international researchers and provides them a conducive environment to share knowledge, disseminate research findings, discuss new ideas, and hence promote and strengthen a knowledge-based society.

In addition, the College very strongly supports, in terms of resources, a number of University Research Centers including the Nanotechnology Research Center, the Remote Sensing & GIS Center, the Communication & Information Research Center, the Oil & Gas Research Center, and the Center of Environmental Studies & Research. We have strong regional and international cooperation with prominent universities in order to expose our students and faculty members to a global experience including Aachen (Germany), Tours (France), Nagoya Institute of Technology (Japan) as well as the Middle East Desalination Research Center (Oman) and the Japan Cooperation Center Petroleum (JCCP), to name a few.

Being a member of the International Association for the Exchange of Students for Technical Experience (IAESTE) has enabled the College to allow many of its students to train in member countries such as Germany, Japan, Greece, UK, Ireland, Norway, Switzerland, and many others. Such kind of abroad training experiences enhance the students' technical and communication skills and further polish their personal and academic development.

We are committed to having the College of Engineering a truly distinguished College in the region, with God's help and guidance, and our continued commitments. We wish our students success during their stay at the university and a prosperous future after graduation.

Dr. Nabeel Al-Rawahi
Dean, College of Engineering

1.2 College Vision

To continue its leading role in engineering education, research and innovation, and community service in the region and beyond.

1.3 College Mission

To excel in engineering education, research and innovation, and community service through creative thinking, promoting the principles of engineering analysis and design, and knowledge sharing with national and international communities.

1.4 College Objectives

1. To prepare highly qualified engineers who are capable of assuming professional careers and pursuing graduate studies.
2. To conduct scientific research to expand knowledge in the scientific and engineering fields, and to find engineering solutions to problems faced by society.
3. To provide continuing education and to disseminate engineering knowledge through conferences, short courses, workshops, consultation, and seminars.
4. To promote regional and international cooperation with reputable universities throughout the world.







2

**ABOUT THE
COLLEGE**

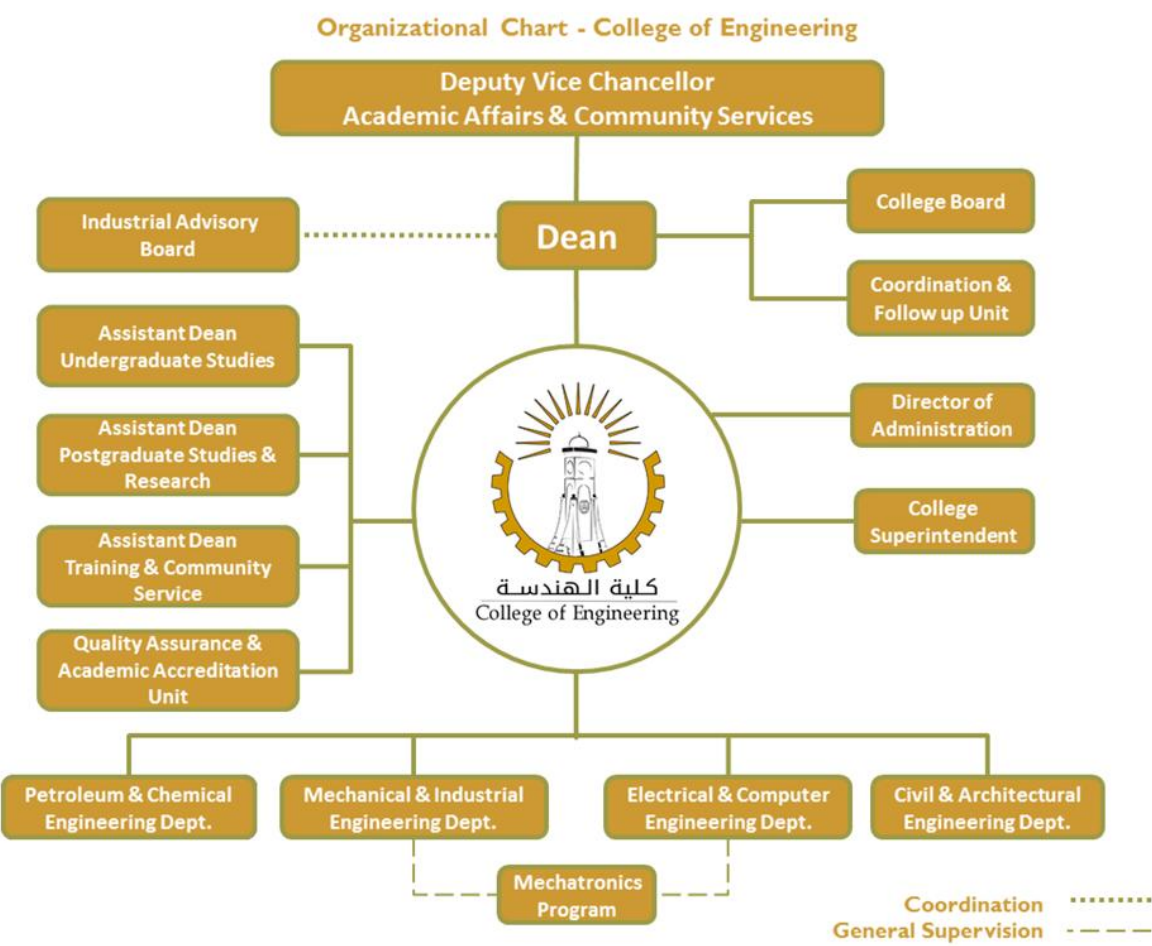


ABOUT THE COLLEGE

2.1 History and Development

When Sultan Qaboos University was established in 1986, the College of Engineering was among the university's first six colleges. Since then, the College has grown from accepting 92 students in 1986 to 480 students in 2025. On the other hand, the number of its programs increased from 4 undergraduate programs in 1986 to 8 undergraduate programs and 17 postgraduate programs in 2025. The increase in the number of students and programs has been accompanied by continuous improvement in the quality of the programs and the contribution to both research and community engagement. All eight undergraduate programs (Civil, Electrical and Computer, Mechanical, Petroleum and Natural Gas, Industrial, Mechatronics, Architectural, and Chemical Engineering) have been accredited by ABET (Academic Board of Engineering and Technology) (under the Engineering Accreditation Commission (EAC)) since 2014, as testimony that the quality of these programs is of top international level.

2.2 Organizational Structure



2.3 College Committees

1. Executive Committee
2. College Board
3. Postgraduate Studies and Research Committee
4. Research Committee
5. Quality Assurance and Academic Accreditation Committee
6. OAAA Committee
7. Examinations Committee
8. College Industrial Advisory Board
9. Staff/Student Liaison Committee
10. Publication and Web Committee
11. Information and Communication Technology Committee
12. Industrial Training & Community Service Committees
13. Risk Management Committee
14. Undergraduate Studies and Curriculum Committee
15. Active Learning Committee
16. Engineering Society Advisors Committee
17. Social Activity Committee
18. College Strategic Planning and Development- Planning and Development Committee
19. College Strategic Planning and Development- Follow up and Reporting
20. College Academic Promotions Committee
21. Steering Committee for Mechatronics Engineering Program
22. Pre-Specialization Academic Advising Unit (PAAU)
23. Technical Staff Training Committee
24. College Probation Advising Committee
25. Renewable and Sustainable Energy Committee
26. Eco-House Management Committee
27. IR4 Committee

2.4 Health and Safety Guidelines

The College of Engineering at Sultan Qaboos University through active participation of all employees, students, visitors, and contractors will strive to manage Health, Safety and Environmental (HSE) risks with the goal of preventing accidents, injuries and occupational illnesses, progressively minimizing environmental impact by reducing discharges and using energy efficiently. The College of Engineering believes that HSE is one of the primary business elements. The College believes that good HSE practice is an integral part of the education process and will contribute to the professional standing of the College.

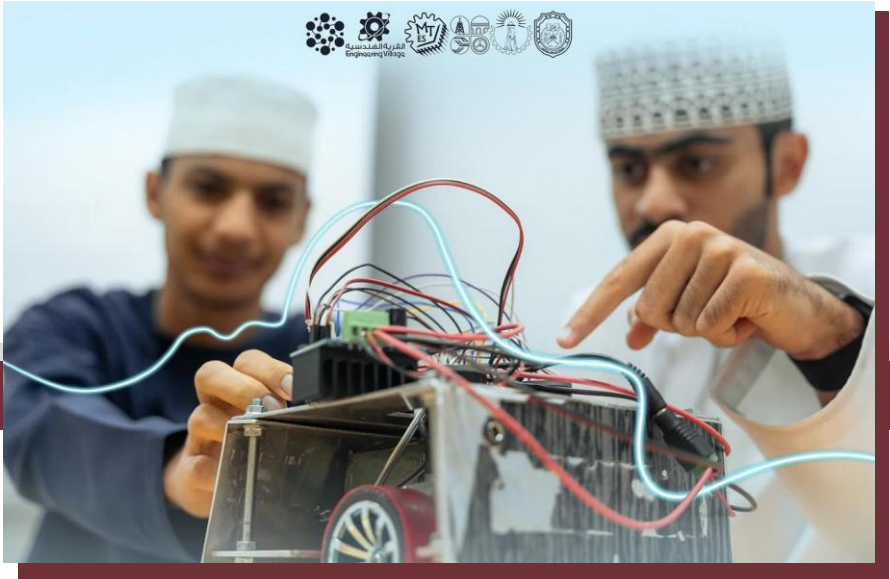
To ensure achieve the highest level of HSE the College of Engineering will:

1. Comply with SQU HSE policy
2. SQU - HSE Code of Practice. (link)
3. Develop and implement HSE measures to ensure an incident and accident-free environment
4. Require the college administration and heads of departments to uphold strict HSE standards in the workplace
5. Develop a high degree of safety consciousness by ensuring continuous HSE education and training for staff and students
6. Maintain regular contact with other HSE organizations to ensure experience sharing and adoption of industry best practice
7. Authorize personnel to stop unsafe acts and conditions
8. Report and record all incidents, accidents and near misses for subsequent analysis and action
9. Ensure that regular audit, monitoring, and maintenance of equipment and facilities meet HSE standards
10. Ensure strict control of hazardous substances by setting storage, handling, and usage rules to recognized local and international standards
11. Provide adequate resources to maintain and monitor HSE measures
12. Develop a forum for staff and student feedback in terms of HSE
13. Develop a meaningful incentive for staff, students, and contractors to enhance HSE measures.

The College will implement this policy through a document describing the Health, Safety and Environmental Management System. All contractors and visitors are required to be committed to and perform their duties according to this policy.



2





3

**ACCREDITATION
AND QUALITY
ASSURANCE**



3.1 OAAAQA Standards Alignment

All undergraduate programmes are designed and delivered in full alignment with the Oman Authority for Academic Accreditation and Quality Assurance of Education (OAAAQA) Standards. The programme learning outcomes are mapped to the Oman Qualifications Framework (OQF) level descriptors to ensure that the expected knowledge, skills, and competencies correspond to Level 8 qualifications. Each course is developed within an outcome-based education framework, ensuring constructive alignment between course learning outcomes, learning activities, and assessment methods. Regular quality assurance processes, such as internal reviews, are conducted to monitor compliance with OAAAQA standards and promote continuous improvement. Stakeholders, including industry representatives, alumni, and students, are actively engaged in curriculum development and review to maintain relevance and responsiveness to national and professional needs. Assessment practices are guided by institutional policies that ensure fairness, transparency, and validity. Furthermore, graduate attributes embedded in each programme reflect OAAAQA expectations for producing competent, ethical, and employable graduates prepared for lifelong learning and contribution to Oman's development.

3.2 International Accreditation History

The college has always strived to ensure and maintain a quality engineering education. After the graduation of the first batch, the college has started to invite 'External Examiners' for every program offered by the college. These external examiners were very carefully selected with the right balance of educational and research experience. This yearly critical review has helped the college to maintain its standard through the first decade.

In Fall semester 2000, the University and College decided to proceed with ABET accreditation, under the Engineering Accreditation Commission (EAC), for all engineering programs. Currently, all undergraduate engineering programs offered by the college are ABET-accredited.

1. The Architectural Engineering (B.Eng.) program offered by the Department of Civil and Architectural Engineering (CAED) is accredited by the Engineering Accreditation Commission (EAC) of ABET (<https://www.abet.org>), under the commission's General Criteria and Program Criteria for Architectural and Similarly Named Engineering Programs.

2. The Civil Engineering (B.Eng.) program offered by the Department of Civil and Architectural Engineering (CAED) is accredited by the Engineering Accreditation Commission (EAC) of ABET (<https://www.abet.org>), under the commission's General Criteria and Program Criteria for Civil and Similarly Named Engineering Programs.
3. The Chemical and Process Engineering program (B.Eng.) offered by the Department of Petroleum and Chemical Engineering (PCED) is accredited by the Engineering Accreditation Commission (EAC) of ABET (<https://www.abet.org>), under the commission's General Criteria and Program Criteria for Chemical, Biochemical, Biomolecular Engineering, and Similarly Named Engineering Programs.
4. The Petroleum and Natural Gas Engineering (B.Eng.) offered by the Department of Petroleum and Chemical Engineering (PCED) is accredited by the Engineering Accreditation Commission (EAC) of ABET (<https://www.abet.org>), under the commission's General Criteria and Program Criteria for Petroleum and Similarly Named Engineering Programs.
5. The Mechatronics Engineering (B.Eng.) program is accredited by the Engineering Accreditation Commission (EAC) of ABET (<https://www.abet.org>), under the commission's General Criteria.
6. The Mechanical Engineering (B.Eng.) program offered by the Department of Mechanical and Industrial Engineering (MIED) is accredited by the Engineering Accreditation Commission (EAC) of ABET (<https://www.abet.org>), under the commission's General Criteria and Program Criteria for Mechanical and Similarly Named Engineering Programs.
7. The Industrial Engineering (B.Eng.) program, offered by the Department of Mechanical and Industrial Engineering (MIED), is accredited by the Engineering Accreditation Commission (EAC) of ABET (<https://www.abet.org>), under the commission's General Criteria and Program Criteria for Industrial and Similarly Named Engineering Programs.
8. The Electrical & Computer Engineering (B.Eng.) program, offered by the Department of Electrical and Computer Engineering (ECED), is accredited by the Engineering Accreditation Commission (EAC) of ABET (<https://www.abet.org>), under the commission's General Criteria and Program Criteria for Electrical, Computer, Communication, Telecommunication(s) and Similarly Named Engineering Programs.



4

**ACADEMIC
DEPARTMENTS**



4.1 Department of Civil and Architectural Engineering (CAE)

4.1.1 Department Overview

Since its establishment in 1986, the Department of Civil and Architectural Engineering has promoted academic excellence, innovation in research, and community engagement. It has continually evolved to meet the dynamic needs of society and industry, offering programs that prepare graduates to address contemporary engineering challenges.

The Department currently offers two accredited undergraduate programs in Civil Engineering and Architectural Engineering, both of which are accredited by the Accreditation Board for Engineering and Technology (ABET). In addition, it offers six postgraduate programs: M.Sc. in Civil Engineering, Environmental Engineering, Water Resources Engineering, Construction Engineering and Management, Architectural Engineering, and a Ph.D. in Civil Engineering. These programs are designed to deliver a balance of theoretical knowledge, research proficiency, and practical application.

With strong enrollment and graduation rates, the Department remains a hub of academic vitality. In 2024 alone, 331 undergraduate students were enrolled, and 59 students graduated across the two undergraduate programs. At the postgraduate level, 62 students were admitted, reflecting the growing demand for specialized expertise in civil and architectural disciplines.

Research excellence is a cornerstone of the Department's vision. In 2024, faculty secured multiple internal and external research grants totaling over R.O. 250,000. This financial support enables innovative research in sustainability, infrastructure, water resources, environmental protection, and digital construction. Looking ahead, the Department continues to update its curricula and expand partnerships to ensure its graduates remain competitive in a fast-changing global market.

Vision of the Department

The vision of the department is to become an outstanding Civil and Architectural Engineering Institute in the Gulf region and beyond.

Mission of the Department

Our mission is to provide high quality Civil and Architectural Engineering education through teaching, research, and development and to provide services to local community. This will be accomplished by:

1. Providing high quality engineering education programs that encompass engineering knowledge, ethics, and values that should enable our graduates to become Professional Engineers.
2. Offering services to the industry through cooperative programs in research, consultancy, and professional development.
3. Promoting communication channels for collaboration with local and international communities to enhance public awareness and advancement of engineering knowledge.



4.1.2 Faculty and Staff



Dr. Mubarak Al-Alawi

Associate Professor, and Head of Department

Research Interests: Construction Engineering and Management, Computer Application in Construction, Circular Economy in Construction, Sustainability, Waste Management



Prof. Ali Al-Nuaimi

Visiting Professor

Research Interests: Structural Design and Analysis



Prof. Khalifa Al-Jabri

Professor

Research Interests: Sustainable Construction Materials, Use industrial waste and byproducts as a construction Material, 3D Concrete, Behavior of materials and structures in fire, Seismic hazard assessment and Earthquake Engineering



Prof. Ali Al-Harthy

Visiting Professor

Research Interests: Use of Local & Recycled Materials in Civil Engineering, Sustainable Development Technologies, Reinforced Concrete Deterioration and Durability, Engineering Education



Dr. Khalid Al-Shamsi

Associate Professor

Research Interests: Characterization of road materials, Asphalt Mixture design, Pavement design and maintenance, Utilization of waste materials in road construction, Road Safety and analysis of traffic crashes



Dr. Hossam Hassan

Associate Professor

Research Interests: Pavement material testing and evaluation, Performance-related testing and evaluation of asphalt concrete mixtures, Mechanistic analysis and modeling of flexible pavement, Recycling of waste and by-product materials in pavement material, Environmental effects on pavement performance.



Dr. Yahia Mohamedzein

Associate Professor

Research Interests: Characterization and Stabilization of Problematic Soils (Expansive Soils, Dune Sands, Sabkha Soils), Numerical Modelling of Soil-Structure Interaction (Foundations, Pipes, Culvert and Earth Structures), Geoenvironmental Engineering, Laboratory and Field Characterization of Soils



Dr. Mohammed Al-Aghbari

Associate Professor

Research Interests: Stabilization of Problematic Soils, Use waste materials as binder for stabilizing soils, Improving bearing capacity of loose soils



Dr. Ashraf Elazouni

Associate Professor

Research Interests: Project scheduling, Project financing, Optimization, Cash flow



Dr. Ghazi Al-Rawas

Associate Professor, Dean of Research

Research Interests: Hydrology with focus on flash flood modeling, drought, in arid and semi-arid environments, Climate change impacts on water resources, and adaptation strategies, Disaster risk reduction and resilience planning and tsunami hazards, Remote sensing and GIS applications in water and environmental engineering

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING



Dr. Sherif El-Gamal

Associate Professor

Research Interests: FRP-reinforced concrete, Structural rehabilitation , Lightweight concrete, FRP durability, The use of waste materials in concrete



Dr. Saleh Al-Saadi

Associate Professor, Director of Sustainable Energy Research

Research Interests: Energy Conservation, Energy Audits, and Design and Analysis of Building Energy Systems, Indoor Environmental Quality, Computational Fluid Dynamics (CFD) for the built environment, Renewable and Sustainable Energy Applications, Sustainable/Smart Buildings and Cities



Dr. Chaham Alalouch

Associate Professor

Research Interests: Sustainable Built Environment, Smart Cities, Spatial Analysis and Space Syntax, Co-Design and Participatory Planning



Dr. Mohammed Reza

Associate Professor

Research Interests: Environmental modeling and risk assessment , Machine learning in water and environment, Sustainable water and environmental analysis, Renewable energy assessment (wave and tidal), Game theory, Water quality in reservoirs, rivers, and groundwater, Modern optimization, Remote sensing



Dr. Mohammed El Diasty

Associate Professor

Research Interests: Positioning and navigation, Mobile mapping , GNSS/INS integration, Hydrography, Gravimetry



Dr. Kazi Abu Sohel

Associate Professor

Research Interests: Steel-concrete composite structures, Structural Dynamics, Construction materials and structures, Fatigue of concrete structures



Dr. Issa Al-Harthy

Associate Professor

Research Interests: Sound and Noise Environment, Environmental Engineering, Indoor Environment



Dr. Tahir Mehmood

Associate Professor

Research Interest: Structural Dynamics, Seismic Evaluation of Structures, Seismic Retrofitting, Progressive Collapse Analysis, Construction Material Testing



Dr. Syed Muhammad Bilal Waris

Associate Professor

Research Interests: Structural Dynamics, Vibration Analysis, Earthquake Engineering, Green Engineering, 3D Printing



Dr. Hanan Al-Khatrri

Associate Professor

Research Interest: Thermal Comfort, Thermal Comfort Scales, Indoor Environmental Quality, Adaptive Behaviour, Climate Responsive Architecture, Engineering Education

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING



Dr. Mohamed Salah-Eldin Saleh

Assistant Professor, Coordinator of Architectural Engineering Program

Research Interests: Sustainable Construction, Building Construction & Management, Architectural Design, Urban Design, Environmental Psychology



Dr. Hayder Khan

Assistant Professor

Research Interest: Member of the Society of Building Science Educators, Member of World Society of Sustainable Energy Technologies (WSSET)



Dr. Talal Etri

Assistant Professor

Research Interest: Coastal Engineering, Water resources, Environmental engineering, Numerical Modelling



Dr. Aliya Al-Hashim

Assistant Professor

Research Interest: Urban Building Energy Modeling (UBEM), Digital Heritage Documentation, Normative Simulation Model, Early Design Decision Making in Architecture



Dr. Zeinab Yavari

Assistant Professor

Research Interest: Treatment of emerging contaminants in the environment, Microplastic detection in wastewater and compost plant, Water and wastewater treatment technologies, Advanced oxidation processes (AOPs), Microbial fuel cell



Dr. Ronald Ekyalimpa

Assistant Professor

Research Interest: Simulation [Discrete Event Simulation - DES, System Dynamics - SD, Agent Based Modeling - ABM], Data Science [Artificial Intelligence-AI/Machine Learning - ML], Optimization



Engr. Juma Al-Ruzaiqi

Senior Engineer

College Superintendent



Engr. Osama Al Hashemi

Engineer B

Department Superintendent



Engr. Jamil Al-Yaqoobi

Senior Engineer



Engr. Hilal Al-Hashemi

Engineer B

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING



Mr. Induka Nilupul Halwalage

Technician



Engr. Abdulrahman Numeiri

Engineer



Engr. Ruqaiya Al-Kharusi

Engineer



Engr. Sundos Al-Habsi

Engineer



Engr. Mazin Al Ma'Mari

Engineer



Engr. Faisal Al-Hinai
Engineer



Mrs. Wafa Al-Nabhani
Coordinate & Follow-Up & Archive Specialist



ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

4.1.3 Academic Programmes

• B. Eng in Civil Engineering

Course Description

Course Code:	CIVL 3002	Course Title:	Drawing I
No. of credit hours:	2	No. of contact hours:	4

A short description:

This basic course is designed to develop student's drawing skills. The course includes all the techniques used in the graphic presentation of engineering problems. It includes lettering, dimensioning, and three-dimensional drawings. The course also includes drawing of reinforced concrete detailing, steel connections and other civil engineering applications such as bridges, dams and wadi cross-section. The students finishing this course will be able to read, understand and draw any general engineering drawings.

Course Code:	CIVL3007	Course Title:	Practical Skills Development
No. of credit hours:	0	No. of contact hours:	

A short description:

This course is compulsory for graduation. This, out of normal teaching course, aims to expose students to practical skills in selected civil and architectural engineering topics. The topics may include but not limited to surveying, geotechnical engineering, structural engineering, water resources and environmental engineering, transportation and highway engineering, architectural engineering. It may also include site visits and field training in the design/construction sites and projects.

Course Code:	CIVL3011	Course Title:	Statics
No. of credit hours:	3	No. of contact hours:	4

A short description: Course part of degree plan for cohorts 2021 onwards

This basic course provides the student with an understanding of the fundamental principles of statics of particles and rigid bodies. This will enable him to apply these principles to the more complex systems associated with mechanics of materials and the analysis of structures in subsequent courses.

Course Code:	CIVL 3020	Course Title:	Engineering Drawing
No. of credit hours:	3	No. of contact hours:	6

A short description:

This basic engineering drawing course is designed to develop student's drawing skills. It includes lettering, dimensioning, three-dimensional drawings, reinforced concrete detailing, steel connections, and other civil engineering applications. The course also introduces the student to computer graphics using AutoCAD. The student will use AutoCAD for the drawing of steel frame sections and details; reinforced concrete members and details; highway horizontal, vertical alignment and cross sections; and hydraulics structures. A student completing this course will be able to understand and draw practical engineering drawings, both manually and using AutoCAD.

Course Code:	CIVL 3036	Course Title:	Structures I
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate course is designed to provide students with basic skills to carry out the analysis of statically determinate beams, frames and trusses; determine linear elastic deformations by geometric methods and work-energy methods; construct influence lines; analyze statically indeterminate beams and rigid frames using displacement methods (slope-deflection method and moment-distribution method).

Course Code:	CIVL 3046	Course Title:	Drawing II
No. of credit hours:	2	No. of contact hours:	4

A short description:

An intermediate course designed to further develop the student's skills in, and understanding of, civil engineering drawing. The course introduces the student to computer graphics using AutoCAD. The student will be required to use AutoCAD for the drawing of steel frame sections and details; reinforced concrete members and details; highway horizontal, vertical alignment and sections; and hydraulics structures. A student completing this course will be able to prepare practical engineering drawing using AutoCAD.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 3056	Course Title:	Surveying
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an introductory course in surveying. The course provides the student with the necessary information and skills for surveying data collection and analysis for use in Civil Engineering. Basic concepts are explained combined with practical exercises on using surveying equipment. The course is supplemented by a field survey training course during the winter break (10 days).

Course Code:	CIVL 3066	Course Title:	Engineering Hydrology
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course addresses principles and practical aspects of hydrology. Topics in engineering hydrology include: hydrologic processes, hydrologic cycle, precipitation, evaporation, infiltration, subsurface water, hydrologic measurements, unit hydrograph, frequency analysis, flood routing; rainfall-runoff analyses, watershed modelling, urban hydrology, and groundwater hydrology.

Course Code:	CIVL 3076	Course Title:	Transportation Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate-level course introduces the student to transport modes, geometric design, traffic-flow characteristics and highway capacity, and the technical implications of transport-related problems, methodologies and techniques. Lectures and problem solving tutorials are used.

Course Code:	CIVL 3086	Course Title:	Mechanics of Materials
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course will cover the fundamental concepts and calculation of stresses and strains in engineering materials. The behaviour of members subjected to loads will be studied to develop a thorough understanding of the relations between loads and stresses developed in the material. This understanding is necessary to develop adequate procedure for design.

Course Code:	CIVL 3096	Course Title:	Construction Materials
No. of credit hours:	3	No. of contact hours:	4

A short description:

This basic course integrates the study of materials science with the applications of materials in construction. The course enables the student to understand the relationships between the structure of a material, its environment and its physical and mechanical properties. Topics include structure of materials, defects and imperfections in materials, strengthening of materials, general properties of materials, use of metals and steel in construction, concrete and its components, fresh and hardened properties of concrete, and concrete mix design. Laboratory tests are conducted to determine different physical and mechanical properties of the material.

Course Code:	CIVL 3106	Course Title:	Geotechnical Engineering I
No. of credit hours:		No. of contact hours:	

A short description:

First course in geotechnical engineering, dealing with phase relations, soil classification, Atterberg limits, compaction, permeability, seepage, consolidation and shear strength. The lectures are supplemented with tutorials and laboratory sessions.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 3216	Course Title:	Basic Mechanics
No. of credit hours:	4	No. of contact hours:	5

A short description:

This basic course provides the student with an understanding of the fundamental principles of statistics and of the dynamics of rigid bodies. This will enable him to apply these principles to the more complex systems associated with mechanics of materials and the analysis of structures in subsequent courses.

Course Code:	CIVL 4006	Course Title:	Probability and Statistics for Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate course gives the necessary background in probability and statistics, with emphasis on inferences and regression analysis. The course, which is tailored to meet the needs of civil engineering students, is taught through lectures, examples and extensive tutorial sessions.

Course Code:	CIVL 4016	Course Title:	Structures II
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate course introduces the basic concepts of the moment- distribution method and its applications to structures. This is followed by the matrix-flexibility and matrix-stiffness methods for the analysis of structures. The plastic theory of structures including the concepts of collapse mechanisms and their applications is considered.

Course Code:	CIVL 4036	Course Title:	Highway Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This advanced course provides information relevant to the materials used for highway construction. Topics include unbound materials (soils and aggregates), bituminous binders and mixtures, production of hot-mix asphalt concrete, road construction and basic earthwork operations, and an overview of thickness design of asphalt concrete pavements. The course consists of lectures and extensive laboratory work.

Course Code:	CIVL 4046	Course Title:	Fluid Mechanics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This basic course provides the student with a working knowledge of the fundamental principles governing fluid mechanics and fluid flow. Lectures covering the properties of fluids, fluid statics, fluids in motion, momentum and energy principles, similitude, dimensional analysis, flow in conduits, and fluid measurements. These lectures are supplemented by laboratory experiments.

Course Code:	CIVL 4106	Course Title:	Geotechnical Engineering II
No. of credit hours:	3	No. of contact hours:	4

A short description:

This specialization course deals with in depth coverage of fundamental topics in geotechnical engineering. It covers compaction, compressibility, shear strength, unsaturated soil behavior, seepage and flow nets, earth pressure theories, and stability of slopes. The lectures are supplemented with handouts, laboratory sessions, tutorials and assignments.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 4136	Course Title:	Environmental Engineering I
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate course introduces the basic concepts of environmental engineering. Topics include environment and ecological balance, impacts on environment, environmental sustainability, sustainable development, water quality (physical - solid contents, colour, turbidity; chemical - pH, electro-neutrality, ionic strength, ionic activity, hardness, alkalinity, carbonate system, COD; and biological - BOD, DO, TOC, microbial count, Streeter-Phelps DO modelling); chemical and biological kinetics modelling (zero, first and second order kinetics) and application for environment, bio-chemical reactor modelling and analysis, basic theory of water treatment, and sanitation in developing countries.

Course Code:	CIVL 4146	Course Title:	Hydraulics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate course aims to teach the design principles for engineering water works such as pipelines, open channels and turbomachinery. Lectures are supplemented by class tutorials and laboratory work.

Course Code:	CIVL 4206	Course Title:	Concrete Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate course develops the student's skill in designing of reinforced-concrete structures. Flexural analysis and design of beams, singly reinforced rectangular beams, doubly reinforced rectangular beams, T-beams. Shear and diagonal tension design, bond, anchorage and development length. Analysis and design of edge supported slabs. Analysis and design of members subjected to axial compression and bending. Reinforcement detailing of concrete members.

Course Code:	CIVL 4216	Course Title:	Steelwork Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate course provides the student with an understanding of the behavior of structural steelwork and the ability to design steel beams, columns, frames and connections such as those encountered in steel-framed buildings and industrial complexes. Lectures are supplemented with tutorials and team projects.

Course Code:	CIVL 4226	Course Title:	Foundation Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course deals with site investigation; stress distribution; settlements analysis, bearing capacity and design of shallow foundations; mat foundations; earth pressure theory; retaining walls; sheet piles; braced excavations; and pile foundations. The lectures are supplemented with handouts, tutorials and assignments.

Course Code:	CIVL 4400	Course Title:	Professional Practice and Ethics
No. of credit hours:	2	No. of contact hours:	2

A short description:

This course introduces students to the fundamental concepts necessary for an understanding of the ethical basis in the engineering work place, engineering professionalism, and the legal and social frameworks in which engineering is practiced. It will allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision-making to engineering issues encountered in academic and professional careers.

This course will give a student an idea of work on multidisciplinary teams. It will give them the broad education necessary to understand the impact of engineering solutions in a global/societal context and it will give them a knowledge of contemporary issues. Topics covered will include ASCE code of practice; societal responsibilities of civil engineers; and consideration of economics, environmental, sustainability, business, public policy, professional licenses and social issues in engineering projects. The course will be supplemented by seminars offered by practicing engineers; case studies (locally and internationally); and site visits.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL5001	Course Title:	CIVIL Program Cooperative Training-I
No. of credit hours:	0	No. of contact hours:	36

A short description:

COOP-I program is designed to bridge the gap between academia and industry in Oman. The training framework of the program is designed in such a way to align the students' competencies with the industry needs and also assure an efficient follow up and tracking of the students' progress. Such training program will allow students to apply and enhance their engineering knowledge and skills learned at the university in a real professional environment that requires technical expertise, teamwork, interpersonal skills, leadership, creativity, work ethics, organizational, cultural and professional networking skills. Furthermore, the training program will increase students' self-confidence and provide them with additional skills required by industry in real work environments. This will complement the knowledge acquired in the classroom through "Learning by Doing".

Course Code:	CIVL5002	Course Title:	CIVIL Program Cooperative Training-I
No. of credit hours:	6	No. of contact hours:	36

A short description:

COOP-II program is designed to bridge the gap between academia and industry in Oman. The training framework of the program is designed in such a way to align the students' competencies with the industry needs and also assure an efficient follow up and tracking of the students' progress. Such training program will allow students to apply and enhance their engineering knowledge and skills learned at the university in a real professional environment that requires technical expertise, teamwork, interpersonal skills, leadership, creativity, work ethics, organizational, cultural and professional networking skills. Furthermore, the training program will increase students' self-confidence and provide them with additional skills required by industry in real work environments. This will complement the knowledge acquired in the classroom through "Learning by Doing".

Course Code:	CIVL5010	Course Title:	Modern Technologies in Civil Engineering
No. of credit hours:	1	No. of contact hours:	2

A short description:

This course introduces a comprehensive overview of the new and modern technologies available in different branches of Civil Engineering, which are not covered in regular Civil Engineering courses. It covers a range of topics, including but not limited to robotics and automation, smart infrastructure, sustainable construction practices, emerging trends such as 3D printing of structures, modular construction, drone technology for surveying, and the integration of artificial intelligence in construction management. Throughout the course, students will engage in hands-on activities and case studies to gain practical experience and develop skills relevant to modern civil engineering practices. The goal is to prepare students to use technology effectively in their future careers and contribute to the advancement of the industry.

Course Code:	CIVL 5076	Course Title:	Coastal Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

An advanced course in the concepts of harbour design: fundamental wave properties, wave transformations, tides, storm surges, tsunamis, wave-structure interaction, sediment transport and the general concepts of breakwater design. Design criteria including wave run-up and overtopping, wave forces and impact loading are reviewed.

Course Code:	CIVL 5096	Course Title:	Concrete Structures
No. of credit hours:	3	No. of contact hours:	4

A short description:

This advanced course gives the student deeper insight into the problems of designing concrete structures, through an intensive study of advanced theory for both reinforced and prestressed concrete members. Theory lectures are supplemented by tutorials and design/drawing classroom.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 5102	Course Title:	Construction Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces construction engineering, including planning, methods, specifications, and production estimation. It covers equipment selection, heavy construction equipment, equipment specifications, performance evaluation, economics, and productivity estimation.

Course Code:	CIVL 5104	Course Title:	Special Topics in Civil Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers contemporary topics in selected areas of civil engineering. The instructor selects the content based on student interests.

Course Code:	CIVL 5106	Course Title:	Slope Stability
No. of credit hours:	3	No. of contact hours:	4

A short description:

This elective course provides the students with an understanding of slope stability and landslides. The course covers an introduction to slope stability, principles and techniques used in stability analysis, remedial and corrective measures for slope stabilization. The course also covers examples of landslides from Oman.

Course Code:	CIVL5111	Course Title:	Global Positioning Systems and Its Applications in Civil Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

Fundamental concept of satellite positioning, the GPS components (satellite, ground and user segments), field planning and office procedures for GPS surveying, GPS instrumentation, GPS observables and modelling, data processing for single point positioning, differential positioning and precise relative positioning. Introduction to modern GPS surveying techniques, real-time and post processed baseline solutions, adjustment of baselines within networks. Applications of GPS in Civil and Site Construction and Engineering, Building Design and Construction & Operation.

Course Code:	CIVL 5122	Course Title:	Highway Materials
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course will cover the following topics: basic properties of aggregates; road subbases; road bases; asphalt production, chemistry, and rheology; asphalt binders and modifiers; asphalt specifications; asphalt concrete mix design; asphalt concrete special mixes (Superpave, stone mastic, large stone mixes, etc.); hot mix asphalt concrete plants; road construction; recycling; pavement distresses and their relation to material properties; and quality assurance/quality control (QA/QC). Laboratory sessions will be part of this course.

Course Code:	CIVL 5126	Course Title:	Concrete Materials & Technology
No. of credit hours:	3	No. of contact hours:	4

A short description:

Concrete and its constituents. Properties & Specification of cement and aggregates. Concrete mixing, placing, Compacting & Curving. Concrete mixes. Admixtures. Concrete in Hot Weather. Strength & durability. Deterioration, Maintenance and Repairing. Production & Quality control. Sulphate attack. Corrosion and Alkali-Silica reaction. Fiber Reinforced Concrete.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 5132	Course Title:	Environmental Geotechnics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the nature of soil and environment, chemical composition of soils, clay mineralogy and structure, characterization of contaminated soils, soil hydraulic conductivity, contaminant transport in porous media, landfills, compacted clay liners, geosynthetics clay liners, engineering properties of municipal solid waste, settlement and stability of landfills, and construction of landfills.

Course Code:	CIVL 5133	Course Title:	Soil Improvement
No. of credit hours:	3	No. of contact hours:	4

A short description:

This specialized course deals with review of problematic soils such as soft and loose soils, expansive soils and collapsible soils; soil compaction, preloading; dewatering and sand drains; soil stabilization using cement, lime, fly ash and cement by pass dust; vibrofloitation; stone columns; deep compaction; geotextile; geogrids; geomembrane; grouting and mechanically stabilized walls.

Course Code:	CIVL 5142	Course Title:	Groundwater
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course is designed to introduce groundwater in more details than hydraulics. Students will be dealing with Darcy's law to measure groundwater flow. Aquifer stress, groundwater storage and pumping tests are issues to be covered in this course. Environmental issues such as groundwater quality, contaminant transport processes and groundwater protection, are also included in this course.

Course Code:	CIVL 5146	Course Title:	Numerical Methods in Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This intermediate course introduces numerical techniques used for solving typical engineering problems. Related structural programming is the objective of computer labs. Selected case studies of Civil engineering problems are solved using these techniques.

Course Code:	CIVL 5150	Course Title:	Remote Sensing
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course is designed to introduce the basic principles of remote sensing and applications to Civil and Geomatics Engineering. This course is a computer oriented. This course covers elements of remote sensing, electromagnetic spectrum, radiation interaction with the earth and atmosphere, spectral signatures of environment, remote sensing sensors and their application, digital image processing, satellite imagery correction and enhancement techniques, data questions, remote sensing platforms, real applications and some case studies.

Course Code:	CIVL 5151	Course Title:	Solid Waste Management
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course is introduced to focus on some ways of controlling municipal solid waste. Several ways of sorting solid wastes from the source will be explained. This course will discuss different ways of handling wastes paring in mind economic and esthetical factors. Some alternatives to landfill of the wastes will be introduced.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 5152	Course Title:	Microbiology for Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course provides an introduction to microbiology relevant to environmental and sanitary engineering and assumes little prior knowledge of the subject. The morphology and biochemistry of some microorganisms such as bacteria, fungi, protozoa, viruses and helminthes will be discussed in some details. The microbiology of drinking water, wastewater (including industrial effluent) and sewage sludge are considered in relation to stabilization processes, nutrient removal and the provision of barriers to the transmission of disease causing organisms.

Course Code:	CIVL 5153	Course Title:	Chemistry for Environmental Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course provides an introduction to water and organic chemistry and assumes that students have taken a basic course in general chemistry. It explains in some details the interaction of solids with water. Large organic molecules such as carbohydrates, proteins, nucleic acids and lipids will be explained. The course will also provide some information about atmospheric chemistry and electrochemistry. A discussion of the chemistry and environmental effects of some chemicals such as pesticides, detergents, waste incineration and landfill is also included in this course.

Course Code:	CIVL5154	Course Title:	Membrane Technology for Water and Wastewater
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces the basic principles of membrane technology as well as its applications. Topics covered include membrane materials and their properties, preparation and characterization of synthetic membranes, transport phenomena through membranes, as well as polarization and fouling. The different types of membrane processes for water treatment as well as their applications, including pressure driven reverse osmosis, concentration driven forward osmosis, thermally driven membrane distillation, membrane contactors, electrically driven membrane dialysis, and membrane bioreactors will also be discussed.

Course Code:	CIVL 5156	Course Title:	Estimating Construction Cost
No. of credit hours:	3	No. of contact hours:	4

A short description:

This final year course provides the student with an understanding of the approximate and detailed estimating of materials and cost of Civil Engineering projects. Emphasis is directed towards concrete structures, including earth work and excavation, construction, labour, equipment etc. The course, also, covers handling, storing and transporting cost of material.

Course Code:	CIVL 5160	Course Title:	GIS in Water Resources
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course focuses on application of Geographic Information Systems (GIS) in Water Resources management. Spatial coordinate systems, terrain analysis using digital elevation models (DEM), digital mapping of water resources information (e.g. precipitation, evapotranspiration, infiltration, soil, and land use). Wadi and watershed networks, wadi flow modelling, flood plain mapping, and integration of time series and geospatial data.

Course Code:	CIVL 5186	Course Title:	Water and Wastewater Management
No. of credit hours:	3	No. of contact hours:	4

A short description:

This senior level course is oriented towards providing an understanding of (1) estimating the water demand and wastewater quantity from different sources, (2) methods of supplying water to the consumers, (3) sewer systems (4) the use of water and wastewater quantity and quality data for treatment process design, (5) the design of unit processes, and (6) the combination of unit processes to produce a total treatment system. The practice in design for the basic elements of conventional biological and physical processes are applied.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 5204	Course Title:	Engineering Economics
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course is an introductory course in engineering economy. The course covers cost concepts and design economics, money-time relationships and equivalence, comparing alternatives, depreciation, cost estimating techniques, price changes and exchange rate, replacement analysis and dealing with uncertainty. The course also introduces economics contemporary issues, business fundamentals such as revenues, and present some aspects of public policy.

Course Code:	CIVL 5206	Course Title:	Traffic Engineering and Management
No. of credit hours:	3	No. of contact hours:	4

A short description:

In this course, the student learns to conduct traffic engineering studies and accident investigation and analysis, through the study of traffic elements and measurements, statistical methods, capacity of intersections and roundabouts, delays, signal design, traffic control and management, queuing, and traffic flow theory.

Course Code:	CIVL 5214	Course Title:	Computer Application in Structural Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

Extension of the matrix stiffness method for the analysis of grids, three dimensional trusses and three-dimensional frames. Efficient use of computers by senior students to solve structural engineering problems is emphasized. Structural analysis and design of steel and concrete are carried out using computer packages such as STAADPro, SAP2000 and others. The skills learned are helpful in understanding the use of commercial software in the structural engineering practice.

Course Code:	CIVL 5216	Course Title:	Pavement Design and Maintenance
No. of credit hours:	3	No. of contact hours:	4

A short description:

This pavement design course introduces the design concepts in designing pavements. The course describes historical development in pavement design, stress computation in flexible pavement, load, and traffic and material characteristics for design. It covers several flexible pavement design methods including the current method of design in Oman Highway Design Manual (2017). Computer software applications are used for stress analysis and pavement design.

Course Code:	CIVL5217	Course Title:	Steel Structures
No. of credit hours:	3	No. of contact hours:	4

A short description:

This advanced course further develops students' knowledge in design of steel structures. It will build on the basic design principles covered in CIVL4216; Steelwork Design and cover advance topics in the structural steel design such as: simple and moment resisting connections, plate girders, frames in simple construction and torsion.

Course Code:	CIVL5226	Course Title:	Airport Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an introductory course on airport design. The course provides students with information on: airport components; aircraft characteristics related to airport design; geometric design of the airfield runways, taxiways and aprons; airside capacity and delay; structural design of pavements; and lighting, signing and marking. A site visit is planned to Muscat International Airport.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 5235	Course Title:	Structural Stability and Dynamics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is course provides students with basic knowledge of structural stability and dynamics for the analysis of civil engineering structures. The topics covered include general principles of stability and dynamics; buckling of beam, columns and frames; design against local and overall stability. Dynamics analysis will cover single-degree-of-freedom systems, multi-degree-of-freedom systems and continuous systems. Students are taught to deal with general stability and vibration problems of frames. The course of specialized context targets at undergraduate students in research or engineering practices relating to structural engineering applications.

Course Code:	CIVL 5236	Course Title:	Prestressed Concrete
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces the student to the analysis and design of prestressed concrete structures. Topics covered include flexure, shear, torsion and deflection of prestressed concrete beams and slabs, and time-dependent effects such as creep and shrinkage.

Course Code:	CIVL 5246	Course Title:	Hydraulic Structures
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course covering the design of hydraulic structures like dams, weirs and culverts. The course develops the student's design skills through integrative practical problems.

Course Code:	CIVL 5254	Course Title:	Environmental Pollution
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course provides knowledge about the fate of contaminants in the environment within a single medium and between media. The course will emphasize on contaminant dispersion within air, soil, and water (surface water, and groundwater). For some applications, students will be taught to identify the dominant transport mechanisms, develop the appropriate equations that quantify the mechanisms, and simplify the system to arrive at solutions that are appropriate. The course will cover contaminant fate and transport topics such as advection, diffusion, dispersion, chemical decay, soil adsorption. Contaminant Plume characterization and identification will also be covered. Air pollution, soil contamination and groundwater contamination and remediation technologies will be covered.

Course Code:	CIVL 5255	Course Title:	Environmental Management Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

A course that describes popular environmental management systems and international standards. The course stresses on environmental auditing types, procedures and report writing. It also involves a practical application of the environmental auditing process.

Course Code:	CIVL 5270	Course Title:	Introduction to Fire Safety Design in Buildings
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an introductory course to the fire safety design in buildings. This course is an elective course offered for senior civil engineering students. This course provides students with basic skills to carry out fire safety design in buildings with particular emphasis on the following topics: introduction to principles of fire and compartment fires, means of escape, human behaviour in fire, detection and warning systems, smoke and heat exhaust ventilation, emergency lighting, alarm systems and sound level calculations, automatic sprinklers protection systems, and aspects of passive fire protection in buildings. The course is covered through lectures and tutorials.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 5296	Course Title:	Design of Masonry Structures
No. of credit hours:	3	No. of contact hours:	4

A short description:

This basic course is aimed at giving the student a thorough understanding of design of masonry structural elements. This lecture course is supplemented by practical design exercises.

Course Code:	CIVL 5306	Course Title:	Specification and Contracts
No. of credit hours:	3	No. of contact hours:	4

A short description:

Job specification writing. Bidding documents. Overview of the construction management process in relation to each phase of a project from the inception of the need by the client to the completion of the work in the field.

Course Code:	CIVL5311	Course Title:	Adjustment Computations
No. of credit hours:	3	No. of contact hours:	4

A short description:

Basic definitions. The Gaussian curve and the random error; The variance, covariance and weight of a measured quantity; Principles of correlation; Least squares method; Adjustment of simple surveying network by parametric method.

Course Code:	CIVL 5326	Course Title:	Environmental Engineering II
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced level course introduces the basic concepts of air pollution control, solid and hazardous waste management, and noise and light pollution control. The course provide a detail understanding of atmospheric physical composition, types and sources of air pollutants, the transport and fate of atmospheric pollutants, Gaussian plume model for air pollutant dispersion, different controlling mechanisms of air pollutants in stationary and moving sources; the solid and hazardous waste types, collection systems, treatment and disposal by composting, anaerobic digestion, incineration, recycling, landfilling, deep well injections and bio-remediation; the source of noise and light pollution and mitigation measures.

Course Code:	CIVL 5336	Course Title:	Construction Management
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course is aimed to provide a comprehensive introduction about construction project management. This course presents principles and techniques in the management of construction projects and present some aspects of public policy. Upon completion of this course, students should have knowledge on the following aspects of construction management: elements of project management, role of leadership in management, construction contracts, project planning and scheduling, project cost estimation, resources allocation and levelling, project cost and time control, and earned value analysis.

Course Code:	CIVL 5346	Course Title:	Water Resources Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This advanced course is designed to provide the essential information required for planning, design, construction, and operation of facilities to control and utilize water. Theoretical aspects are reinforced with practical applications.

Course Code:	CIVL 5376	Course Title:	Conservation of Structures
No. of credit hours:	3	No. of contact hours:	4

A short description:

History of architecture and development in past. Conservation, restoration, preservation & revitalization of monuments. Process of decay and deterioration. Causes of deterioration. Classification of monuments and materials of construction. Engineering aspects of restoration. Case studies in Oman and outside of Oman. Visits and practical exercises in documentation, identification, morphology, repair methodology etc.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL5462	Course Title:	Cementitious Materials and Concrete Technology
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course provide a comprehensive understanding on some major topics related to concrete technology: Portland cement manufacturing, cement hydration, microstructure, properties and types of cement. Fresh concrete and hardened Properties of concrete, dimensional stability of cement-based materials, durability of concrete (corrosion, sulfate, ASR, Acids, etc), some advanced laboratory techniques for concrete, special types of concretes (high strength/performance concrete, Self-compacting concrete, fibre-reinforced concrete, lightweight concrete). Chemical and mineral additives in concrete are also covered.

Course Code:	CIVL5600	Course Title:	Introduction to Photogrammetry
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course conveys the fundamentals of photogrammetry. The objective is to supply students with the principles and applications in photogrammetry through image acquisition and measurements. Topics cover in course involve cameras' basics, mathematical models relate the image and object space, collinearity and coplanarity conditions, orientation parameters (interior, exterior) and various mathematical and geometric models in photogrammetric operations.

Course Code:	CIVL 5662	Course Title:	Building Materials
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an introductory course to the most used and contemporary building materials other than concrete and steel. It is an elective course targeting senior Civil and Architectural engineering students. The course provides students with basic skills and knowledge on the following topics: Masonry: stones, clay bricks and concrete blocks, physical and chemical properties, structural and non-structural behaviour of masonry, thermal properties of masonry products, uses and application of different masonry products, deterioration and conservation of masonry; Masonry mortar: design, properties and uses; Lime, Gypsum and Plaster: properties, design, performance and rehabilitation; Wood and Timber: structure, composition, mechanical properties, defects, deformation, durability and failure in timbers; Other building materials: paint, tiles, coatings, adhesives etc. might also be discussed.

Course Code:	CIVL5664	Course Title:	Contemporary Materials in Civil Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course provides a comprehensive overview of cutting-edge materials revolutionizing the construction industry. The course offers a thorough understanding of modern and smart building materials. Through a blend of lectures, case studies, seminars, and some hands-on experiments, students will gain in-depth knowledge and understanding of the characteristics, applications, and manufacturing processes of emerging materials such as new concrete materials, ultra-high-performance concrete, self-compacting, and self-healing concretes, 3D concrete printing, geopolymers, nanomaterials, innovative composites and metal alloys materials, sustainable building materials, and new materials for infrastructure development. Exploring how these materials address challenges ranging from climate change resilience to resource efficiency and how they contribute to the development of smarter, more sustainable infrastructure. Students will gain an understanding of how these new materials affect civil infrastructure design, building, and maintenance.

Course Code:	CIVL 5678	Course Title:	Administration of Contracts
No. of credit hours:	3	No. of contact hours:	4

A short description:

This final year course provides knowledge about the types of projects constructed in Oman and administration of construction projects based on the contracts used. The course will concentrate on discussions of implementing the construction contracts using the Omani Unified contract for Civil Engineering Works "Standard Documents for Building and Civil Engineering Works" Third Edition, 1999 and FIDIC. Case studies using some projects executed in Oman will be discussed. For some applications, students will be required to study real construction cases and present findings in front of complete class. Also, Consultancy Services Contracts "Standard Form of Agreement and Conditions of Engagement for Consultancy Services for Building and Civil Engineering Works, Second Edition, March 1987" will be studied given at the beginning of the course including all pre-contract services.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL5680	Course Title:	Construction Planning & Scheduling (Computer application)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course gives students hand-on experience of the different aspects related to the planning and scheduling of construction projects using the commercial software available in the market. The scheduling skills acquired through this course enables students to devise project schedules and monitor the progress which are the two components of project time management.

Course Code:	CIVL 5991	Course Title:	Design Project I
No. of credit hours:	2	No. of contact hours:	4

A short description:

This is the first course of two design project courses which challenges the student to synthesize various subject areas in order to produce an engineering solution for a practical design problem. The students will design a system, component, process in at least two civil engineering contexts, including principles of sustainability in design. The aim is to prepare the student for professional work in a design office situation. The course involves team work, design calculations, production drawings and presentation.

Course Code:	CIVL 5992	Course Title:	Design Project II
No. of credit hours:	3	No. of contact hours:	6

A short description:

This is the second course of two design project courses which challenges the student to synthesize various subject areas in order to produce an engineering solution for a practical design problem. The students will design a system, component, process in at least two civil engineering contexts, including principles of sustainability in design. In addition, the student will be exposed to different aspects of construction management to be integrated with parts of the project. The aim is to prepare the student for professional work in a design office situation and construction industry. The course involves team work, design calculations, production drawings and presentation.

Course Code:	CIVL 5993	Course Title:	Research Project I
No. of credit hours:	3	No. of contact hours:	6

A short description:

This first phase of the research project aims to develop the student's initiative and awareness of independent engineering thought process. Each student is assigned a topic and is required, under the guidance of the project supervisor, to plan and carry out associated research which may be both experimental and analytical over a total period of one semester. The student will be required to submit a report on his work at the end of the semester.

Course Code:	CIVL 5994	Course Title:	Research Project II
No. of credit hours:	3	No. of contact hours:	6

A short description:

This second phase of the research project aims to develop the student's initiative and awareness of independent engineering thought process. Each student is assigned a topic and is required, under the guidance of the project supervisor, to plan and carry out associated research which may be both experimental and analytical over a total period of one semester. The student will be required to submit a report on his work at the end of the semester.

Course Code:	CIVL 5995	Course Title:	Project I
No. of credit hours:	2	No. of contact hours:	4

A short description:

This is the first course of two design project courses which challenges the student to synthesize various subject areas in order to produce an engineering solution for a practical design problem. The students will design a system, component, process in at least two civil engineering contexts, including principles of sustainability in design. The aim is to prepare the student for professional work in a design office situation. The course involves team work, design calculations, production drawings and presentation.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 5996	Course Title:	Project II
No. of credit hours:	2	No. of contact hours:	4

A short description:

This is the second course of two design project courses which challenges the student to synthesize various subject areas in order to produce an engineering solution for a practical design problem. The students will design a system, component, process in at least two civil engineering contexts, including principles of sustainability in design. In addition, the student will be exposed to different aspects of construction management to be integrated with parts of the project. The aim is to prepare the student for professional work in a design office situation and construction industry. The course involves team work, design calculations, production drawings and presentation.

Course Code	CIVL3216	Course Title	Basic Mechanics
No. of credit hours	4	No. of contact hours:	5

A short description:

This basic course provides the student with an understanding of the fundamental principles of statistics and of the dynamics of rigid bodies. This will enable him to apply these principles to the more complex systems associated with mechanics of materials and the analysis of structures in subsequent courses.

Course Code	CIVL 3002	Course Title:	Drawing I
No. of credit hours	2	No. of contact hours:	4

A short description:

This basic course is designed to develop student's drawing skills. The course includes all the techniques used in the graphic presentation of engineering problems. It includes lettering, dimensioning, and three-dimensional drawings. The course also includes drawing of reinforced concrete detailing, steel connections, and other civil engineering applications such as bridges, dams, and wadi cross-sections. The students finishing this course will be able to read, understand and draw any general engineering drawings.

Course Code	CIVL 3046	Course Title:	Drawing II
No. of credit hours	2	No. of contact hours:	4

A short description:

An intermediate course designed to further develop the student's skills in, and understanding of, civil engineering drawing. The course introduces the student to computer graphics using AutoCAD. The student will be required to use AutoCAD for the drawing of steel frame sections and details; reinforced concrete members and details; highway horizontal, vertical alignment and sections; and hydraulics structures. A student completing this course will be able to prepare practical engineering drawing using AutoCAD.

• B. Eng in Architectural Engineering

Course Description

Course Code:	AREN2111	Course Title:	Architectural Design (1): Basic Design
No. of credit hours:	3	No. of contact hours:	6

A short description:

Foundation studio aimed at developing critical and conceptual design skills. Students develop understanding of design through exploring 2 & 3D pattern making, form and space compositions, exploration of design domain, design analysis and simple design problems. Small projects are used to explore the domain of architectural design and enhance communication skills.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	AREN2312	Course Title:	Architectural Drawing
No. of credit hours:	2	No. of contact hours:	4

A short description:

The aim of this basic course is to develop student's knowledge, understanding and communication skills required for producing general architectural engineering drawings. The course covers the following topics: drawing tools and materials, principles of orthographic representation (plan, elevation, section), and three-dimensional drawings (isometric, axonometric), and architectural standards. By the end of this course students should be able to read, understand, and draw general architectural engineering drawings.

Course Code:	AREN2313	Course Title:	Architectural Graphics
No. of credit hours:	3	No. of contact hours:	6

A short description:

The aim of this course is to enhance knowledge and understanding of the relation of perception and representation through free-hand drawing and graphical communication. The course covers the following topics: drawing and observation: line and shape, contour, tone and texture, light and color, form and structure, space and depth; principles of shade and shadow, and perspective drawing.

Course Code:	AREN2411	Course Title:	History of Architecture (1): Modern and Contemporary
No. of credit hours:	2	No. of contact hours:	2

A short description:

Course examines historical development in western art and architecture from the industrial revolution to the present. Focus is on understanding how cultural settings shaped the direction of artistic thinking and built form in each period. Emphasis is on technical developments, artistic movements, institutions (such as Bauhaus) and important personalities.

Course Code:	AREN3112	Course Title:	Architectural Design (2): Simple Function
No. of credit hours:	3	No. of contact hours:	6

A short description:

Understanding the generic design process with emphasis on conceptualization, order, function, and form and space relationship. Structure and environment are also introduced as design issues. Design focus is on simple buildings with limited functional and technical complexity for different sites, situations, and programs, and design ideas are developed through analytical and compositional studies.

Course Code:	AREN3113	Course Title:	Architectural Design (3): Complex Multi-Function
No. of credit hours:	4	No. of contact hours:	8

A short description:

The course will address, through methodical design process, complex architectural organization in terms of function, context, structure, formal expression and environmental considerations. Also, the course will address technical aspects such as choice of materials and the design of architectural details. Human needs and values, visual and physical qualities of the designed environment are expected to be addressed.

Course Code:	AREN3211	Course Title:	Architectural Design Theory
No. of credit hours:	2	No. of contact hours:	2

A short description:

Course examines design theory as a means to develop cognitive and problem solving skills. Difference between theory and design theory of architecture is explored. Also explored are issues of order and organization, phenomena of perception, elements and organizing principles of form and space, ordering principles, design typology, designers and design thinking, and design process.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	AREN3312	Course Title:	Introduction to Computer Aided Architectural Design
No. of credit hours:	3	No. of contact hours:	5

Course introduces students to digital media and its application in architecture. Focus is on enabling skill acquisition in the use of 2D drafting, 3D modelling and Rendering software. Image processing and post production programs may also be explored.

Course Code:	AREN3313	Course Title:	Architectural Working Drawing
No. of credit hours:	3	No. of contact hours:	6

A short description:

Introduce methods of preparing working drawing as part of building construction documents and provides a hands-on experience in preparing such documents. The course will emphasize the use of computer in generating such drawings. Topics to be covered include: working drawing conventions, drawing organization, working drawing of plans, sections, elevations, and details.

Course Code:	AREN3412	Course Title:	History of Architecture (2): Islamic and Vernacular
No. of credit hours:	2	No. of contact hours:	2

A short description:

This course concentrates on Islamic architecture in different regions and times. It searches for the forms while examining the embedded meanings and symbolic appearances. It examines the design principles of different styles in Islamic architecture. A field trip to observe and document a selected traditional Omani architecture is undertaken as part of the course.

Course Code:	AREN3611	Course Title:	Principles of Settlement Planning
No. of credit hours:	2	No. of contact hours:	2

A short description:

Overview of the historical development of human settlements. Examination of different types, morphology, structure and growth of settlements. Overview of factors influencing settlement form and growth. Contemporary urban form with emphasis on the influence of rapid urbanization. Examination of settlement form in Oman in the context of global practices. Sustainability issues in settlement planning.

Course Code:	AREN3808	Course Title:	Computer Aided Lighting Design
No. of credit hours:	2	No. of contact hours:	2

A short description:

The course will give a review in lighting design (daylighting and artificial lighting). Introducing overview of modelling of the building and simulation of lighting. Concepts relating to the simulation of daylight, sunlight and artificial lighting in buildings. Use of on-market simulation tools such as: Ecotect and Radiance software.

Course Code:	AREN3809	Course Title:	Architectural Conservation Techniques
No. of credit hours:	2	No. of contact hours:	2

A short description:

The course will cover: evolution of historical conservation, historic buildings and architectural cultural heritage, conservation decisions, ethics, and values, conservation team, causes of decay in historic buildings. The course will introduce different methods of intervention and techniques, and examples from different geo-climatic regions and periods.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	AREN3811	Course Title:	Building Construction Methods
No. of credit hours:	3	No. of contact hours:	4

A short description:

Types of structures and their construction methods and techniques. Foundation, floor, wall and roof systems. Moisture and thermal protection. Doors and windows. Building details. Pre-fabrication techniques of building components. Construction techniques of special form: dome, vault, shell, space frame and metal structure. Local materials and construction systems. Building joints and movements. Finishing and cladding.

Course Code:	AREN3812	Course Title:	Architectural Acoustics
No. of credit hours:	2	No. of contact hours:	3

A short description:

This course introduces theoretical foundations, computational approaches, and design methods in architectural acoustics (room acoustics, building acoustics, noise control). Topics include a review of the physical properties of sound, fundamentals of sound perception, prediction of air-borne and structure-borne sound propagation, noise control, relevant design methods, and fieldwork measurements will be introduced.

Course Code:	AREN3814	Course Title:	Climate-responsive Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course addresses the impact of hot climate on architectural design. Topics covered are: Climatic elements and site microclimate, Human comfort, Solar control, Shading systems, Wind movements and ventilation, Urban environment and dynamics of external space, Built environment and effects of the building envelop.

Course Code:	AREN3815	Course Title:	Sustainable Design in Hot Climates
No. of credit hours:	2	No. of contact hours:	2

A short description:

This course addresses the issues of sustainable architectural design in hot climates. The course covers: global issues of sustainability and green architecture, environmental constraints on future sustainability, problems of non-sustainable cities, future sustainable urban patterns in Oman, bases and application of sustainability rating systems of LEED - LEED/N- Estidama, study and analyses of examples of sustainable building projects in the world.

Course Code:	AREN3816	Course Title:	Building Mechanical Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

Psychrometrics, human thermal comfort in the internal environment, basic heat transfer in buildings, heating and cooling load calculation, introduction to computerized cooling load calculation, air-conditioning systems and equipment, air duct design, air distribution systems design, fan design, vertical transportation systems design.

Course Code:	AREN4113	Course Title:	Research Project
No. of credit hours:	1	No. of contact hours:	2

A short description:

This course focuses on the preparatory research studies of the graduation project's requirements in response to cultural, social, environmental, and urban context factors. The research study should cover the requirements of the three main areas of the graduation project: architectural, and HVAC.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	AREN4114	Course Title:	Architectural Design (4): Design in an Urban Context
No. of credit hours:	4	No. of contact hours:	8

A short description:

Studio explores design at the scale of the urban context. Focus is on designing a new housing neighbourhood or intervention aimed at neighbourhood/district regeneration. Scope covers design of architectural elements and their situation in the urban context. Attention is paid to contextual issues, such as site, location, and climate. Social, cultural and behavioural issues are also addressed.

Course Code:	AREN4115	Course Title:	Graduation Project (1)
No. of credit hours:	4	No. of contact hours:	8

A short description:

The graduation project (1) aims at developing a comprehensive architectural design. The architectural solution should integrate the requirements of structural and HVAC systems as a translation of the previously prepared design report.

Course Code:	AREN4202	Course Title:	Architectural Professional Practice
No. of credit hours:	2	No. of contact hours:	2

A short description:

Issues affecting current architectural theory and practice. Legal framework of practice and the role of the architect in building industry and process. The regulatory system: planning and urban design controls, building code and approval process. Management principles and practices for the range of architectural practice. The selection process and the conditions of the design market. Responsibilities and liabilities of different building professionals in all sectors of practice as the outcome of their relationship to local authorities and current building legislation.

Course Code:	AREN4203	Course Title:	Behavioral Factors in Housing Design
No. of credit hours:	2	No. of contact hours:	2

A short description:

Introduction to the science of spatial behaviour. Perceptual learning and way finding. adaptation. motivation. emotion development and cultural and personal context, and the process of feedback. Human Senses (vision; olfactory, auditory, touch) and Sensory process. Perception cognition. Social influence on behaviour and space syntax. Personal space and territoriality.

Course Code:	AREN4205	Course Title:	Residential Planning and Design
No. of credit hours:	2	No. of contact hours:	2

A short description:

Course examines housing planning, design and financing issues with a focus on urban areas. Issues covered include housing problems, housing market and planning, family cycle and housing demand, delivery systems, types of housing, housing design, criteria for housing location, and neighbourhood planning. Concepts such as territoriality, sense of place and defensible space are also examined.

Course Code:	AREN4222	Course Title:	Fire and Smoke Control in Buildings
No. of credit hours:	2	No. of contact hours:	2

A short description:

This is an introductory course to the fire and smoke control in buildings. This course is an elective course offered for senior architectural engineering students. This course provide students with basic skills to carry our fire safety design in buildings with particular emphasis on the following topics: introduction to Principles of fire and compartment fires, means of escape, human behaviour in fire, detection and warning systems, smoke and heat exhaust ventilation, emergency lighting, alarm systems and sound level calculations, automatic sprinklers protection systems, and aspects of passive fire protection in buildings. The course is covered through lectures and tutorials.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	AREN4304	Course Title:	Special Topics in Computer Aided Design
No. of credit hours:	2	No. of contact hours:	3

A short description:

Course explores emerging ideas and applications of information technology in architecture. It provides a forum for faculty to share research findings and or experience in the use of Computer Aided Design, or to explore the use of particular computer programs. The course also serves to cater for the CAD interest of students.

Course Code:	AREN4305	Course Title:	Introduction to Interior Design
No. of credit hours:	2	No. of contact hours:	3

A short description

This course introduces students to principals of interior design. The course explores the historical background of the interior design, space planning and spatial arrangements, furniture, style, materials and finishes, illumination, psychological and functional effects of colors, and human factors through assignments and projects. Several design communication means might be used (free hand drawing, manual drafting, CAD and models).

Course Code:	AREN4306	Course Title:	Spatial Analysis Techniques
No. of credit hours:	2	No. of contact hours:	2

A short description:

This course introduces students to principles of spatial analysis techniques, namely space syntax theory and the associated methods. The course explores the role of space design -at micro (building) and macro (city) levels- on the socio- cultural, behavioural and economic activities. After the theoretical background and basic knowledge of the analytical techniques are established through lectures and assignments, students will learn to use the related software to perform the analysis. All knowledge gained during the course will be used in a research project.

Course Code:	AREN4601	Course Title:	Landscape Design in Hot Regions
No. of credit hours:	2	No. of contact hours:	3

A short description:

Comprehensive application of landscape design skills. Landscape-design applications involving site inventory and analysis, functional and planting diagrams, preliminary and master planning. Theories & concepts for creating exterior spaces with plant materials; and the principles, concepts, and techniques used by landscape architects in the design of a variety of landscape types, including soft-and-hard-scape that will be applied on real projects in Oman.

Course Code:	AREN4604	Course Title:	Concepts and Elements of Urban Design in Hot Regions
No. of credit hours:	2	No. of contact hours:	3

A short description

This course will discuss and present terms, concepts, fundamentals, principles and the criteria of urban design. The urban design criteria in addition to social and cultural factors that influence the urban context will be discussed with particular emphasis on formal aspects of urban design and applied on real design project of Omani-built-up environment.

Course Code:	AREN4813	Course Title:	Building Illumination
No. of credit hours:	2	No. of contact hours:	3

A short description:

The course introduces theoretical foundations, computational approaches, and design methods in building illumination (daylighting, electrical lighting). Topics include: Review of visual performance criteria and lighting psychology, analytical and numeric methods for the prediction of lighting conditions in interior spaces, lighting engineering and design methods. Computer-aided lighting design methods will be introduced.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	AREN4817	Course Title:	Sanitary and Plumbing Design
No. of credit hours:	2	No. of contact hours:	3

A short description:

Basic elements, organization, design and layout of plumbing, sanitation and fire safety systems in buildings; plumbing systems including water sources, water requirements, water supply and distribution in buildings; sanitary systems including drainage, venting, storm water, waste disposal and recycling; fire safety systems.

Course Code:	AREN4818	Course Title:	Building Electrical Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction, electrical safety, DC circuits, AC circuits, polyphase, transformers, electrical systems, electrical wiring for various types of buildings, electrical distribution and circuit design, and electrical drawing.

Course Code:	AREN5116	Course Title:	Graduation Project (2)
No. of credit hours:	3	No. of contact hours:	6

A short description:

The second part of the graduation project course is focusing on integrating the structural and building system designs with the previously accomplished architectural design in part one. The first phase of the course is devoted to design structural and services systems and preparation of related working drawing. Then, architectural solution revision and preparation of final presentation to be addressed.

Course Code:	AREN5403	Course Title:	Omani Vernacular Architecture
No. of credit hours:	2	No. of contact hours:	2

A short description:

This course concentrates on the Vernacular Architecture in Oman. It aims at introducing in general the typologies of settlements and buildings developed by Omanis through their traditional know-how. It will explore some representative buildings of the different types of construction. The course will also link the differences of typologies with the climatic regions in the country as well as the historical events it went through. Field work will be introduced. Field work will be introduced to learn and apply the technics of architectural documentation on site and rendering by using traditional and technological tools. The main outcome of the course will be the documentation of specific settlements and buildings.

Course Code:	AREN5801	Course Title:	Solar Energy in Buildings
No. of credit hours:	2	No. of contact hours:	2

A short description:

Available solar radiation, radiation on opaque and transparent materials, theory, types, and performance of solar collectors, energy storage in solar systems, solar water heating in buildings, passive and active solar heating, design of solar heating systems, solar cooling in buildings, desiccant cooling systems, economics of solar systems, computer applications.

Course Code:	AREN5802	Course Title:	Modern Building Construction Systems
No. of credit hours:	2	No. of contact hours:	2

A short description:

Advanced aspects of building construction and green building solutions, new technological aspects of building structure and material: reinforced concrete, prefabrication, pre-cast concrete, steel framing systems; innovative building envelope systems: curtain walls, window walls, glazing and roofing systems; new industrialized methods of designing and assembling buildings.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	AREN5805	Course Title:	Building Energy Conservation and Analysis
No. of credit hours:	2	No. of contact hours:	3

A short description:

Energy conservation as a design determinant, energy use in buildings in Oman, design techniques to minimize energy consumption in building, mechanical and electrical systems, energy conservation standards & codes, computer models for estimating building energy consumption, computer-aided energy analysis and evaluation of alternative building energy conservation measures (ECMs).

Course Code:	AREN5819	Course Title:	Specifications and Quantities
No. of credit hours:	2	No. of contact hours:	2

A short description:

The course focuses on the principles underlying specification writing and material selections and the preparation of project tender documents. Understanding various types of materials according to international and local standards. Bill of quantities calculations and ways of integrating drawings with quantities.

• MSc. in Civil Engineering

Course Description

Course Code:	CIVL 6110	Course Title:	Advanced Concrete Structures
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course offers an advanced study of reinforced concrete design based on the British Standard BS8110, applying the ultimate limit state design approach. Students will enhance their understanding of fundamental concepts and apply these in advanced design contexts, including ribbed and flat slabs, continuous beams, slender columns, wall, combined, and raft foundations, frame analysis, and design for wind and gravitational loads.

Course Code:	CIVL 6150	Course Title:	Finite Element Method
No. of credit hours:	3	No. of contact hours:	3

A short description:

Theoretical basis of the finite element method. Elements for use in the solution of two- and three-dimensional stress problems. Plate-bending problems and shell problems. Static and dynamic loading.

Course Code:	CIVL 6150	Course Title:	Advanced Steel Design
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advanced course provides specialized knowledge in the design and analysis of structural steel members and frames, focusing on both conceptual and technical skills. Topics include the design of beams, columns, portal frames, Braced frames and composite constructions (composite beams, composite columns and composite slabs). The course will address complex multistorey continuous frame designs, advanced connection design, and fire protection strategies for steel structures. Emphasis is placed on solving intricate structural problems, evaluating advanced design solutions, and applying regulatory frameworks and current research in the field. Students will engage in independent evaluations and develop innovative approaches to high-level steel design challenges.

Course Code:	CIVL6135	Course Title:	Advanced Concrete Technology
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course offers a comprehensive exploration of advanced topics in concrete technology, focusing on both fundamental principles and innovative practices. Key areas include the behaviour and characteristics of concrete's workability, cementitious materials, strength, durability, dimensional stability, and the microstructure of hardened cement paste. Students will examine the development and application of special types of concrete, as well as the influence of chemical, mineral, and pozzolanic admixtures on concrete's performance. The course also introduces non-destructive evaluation techniques for assessing concrete properties, equipping students with the theoretical and practical knowledge needed to address complex challenges in modern concrete construction and materials research.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 6190	Course Title:	Seismic Design of Buildings
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advance course would discuss the concepts of dynamics relevant to seismic design like Response spectrum, Design Response Spectrum, Equivalent Static Seismic Load, and Multi-mode analysis. Seismic Analysis of buildings using computer applications will be covered and the Design provision of Omani seismic code for buildings will be discussed.

Course Code:	CIVL6340	Course Title:	Difficult soil and ground improvements
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advanced course deals with characterization of difficult soils such as collapsible soils, sabkha soils, gypsum soils and soft, compaction, dynamic compaction, soil stabilization, grouting, geotextiles, geomembranes, geogrids, stone columns, sand drains, dewatering, mechanically stabilized walls.

Course Code:	CIVL 6120	Course Title:	Bridge Structures
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course is aimed at giving the student a thorough understanding of structural analysis of bridge structures, including the principle of load distribution. Content includes: Principles of load distribution, Sallow superstructure bridge, Multibeam and multispan bridges, Design of multispan.

Course Code:	CIVL6125	Course Title:	FRP Reinforced Concrete Structures
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course explains the background of fiber-reinforced polymer bars, their physical and mechanical properties, advantages, disadvantages, durability, and their applications in concrete structures. General design considerations are discussed including design philosophy and design materials properties. Flexural and shear strengths of FRP-RC elements are included. The course also discusses shrinkage and temperature reinforcement, development length, and splices of FRP bars.

Course Code:	CIVL 6140	Course Title:	Theory of Plates and Shells
No. of credit hours:	3	No. of contact hours:	3

A short description:

This is an advanced course in structural mechanics. The course discusses the various methods used for analysis of plates and shells. It covers: - Symmetrical bending and laterally loaded plates, Rectangular plates, Shell deformation, Cylindrical Shell, Shells having form of a surface of revolution, Numerical methods in plate and shell problems.

Course Code:	CIVL6170	Course Title:	Structural Dynamics
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course covers analysis of structures subjected to dynamic loads. Theory developed for single degree of freedom system and generalized to multiple degree of freedom and continuous systems. Analytical and numerical techniques for solution for solution of equations of motion. Transient, steady state, and modal response. Analysis of nonlinear structural response. Distributed-parameter systems. Applications to earthquake design and presentation of practical methods.

Course Code:	CIVL6340	Course Title:	Difficult Soils and Ground Improvement
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advanced course deals with characterization of difficult soils such as collapsible soils, sabkha soils, gypsum soils and soft, compaction, dynamic compaction, soil stabilization, grouting, geotextiles, geomembranes, geogrids, stone columns, sand drains, dewatering, mechanically stabilized walls.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL6380	Course Title:	Geoenvironmental Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course exposes the engineering students to environmental problems related to soils and groundwater contamination. It covers the engineering properties and chemical composition of soils, clay mineralogy and structure, soil hydraulic conductivity, groundwater flow, contaminant transport in porous media, investigation and characterization of contaminated sites, remediation processes, beneficial use of cleaned soil for construction, containment of waste and landfills. Remediation of groundwater. The student will know how to integrate basic engineering disciplines (soil mechanics, transport in porous media, physics and chemistry) to address the geoenvironmental problems.

Course Code:	CIVL6165	Course Title:	Rehabilitation of Structures
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course will cover causes of deterioration of constructed facilities; strengthening of bridges and buildings; mechanics of fiber composite materials; application of advanced fiber composites in new structures and in rehabilitation of existing structures.

Course Code:	CIVL6185	Course Title:	Prestressed Concrete
No. of credit hours:	3	No. of contact hours:	3

A short description:

In addition to the fundamental concepts of analysis and design of prestressed concrete members such as flexure, shear, torsion and deflection control, additional important topics are covered. These are: prediction of prestress losses, design of end blocks, analysis and design of PC columns and slabs.

Course Code:	CIVL6320	Course Title:	Advanced Foundation Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course covers advanced topics in foundation engineering. It includes:- rigid and elastic methods for analyzing footings; unsymmetrical footings; design of dynamically loaded footings; design of footings for earthquake conditions. Pile foundations; static and lateral loads; negative skin friction; bearing capacity and settlement of pile groups, ground improvement.



ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

• **MSc. in Civil Engineering (Environmental Engineering)**

Course Description

Course Code:	CIVL6715	Course Title:	Chemistry & Microbiology of Water & Wastewater
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course provides an in-depth exploration of the fundamental chemical and biological principles essential for the advanced understanding of water and wastewater systems. Topics encompass chemical kinetics, acid-base equilibria, redox processes, solubility phenomena, foundational organic chemistry relevant to environmental contexts, microbial metabolism pathways, characterization of key microorganisms in engineered and natural aquatic environments, pathogen detection and control strategies, and modeling of microbial growth kinetics. Emphasis is placed on critical analysis, quantitative assessment, and integration of contemporary research to develop innovative solutions for complex environmental engineering challenges.

Course Code:	CIVL6780	Course Title:	Contaminant Transport Processes
No. of credit hours:	3	No. of contact hours:	3

A short description:

This postgraduate-level course, "Contaminant Transport Processes," is integral to the Environmental Engineering Program and explores the advanced principles of contaminant dynamics in the environment. Emphasizing highly specialized knowledge, the course examines the mechanisms of contaminant dispersion across air, soil, and water (including surface water and groundwater) and their interactions between media. Students will critically analyze dominant transport mechanisms, derive equations to quantify these mechanisms, and develop innovative solutions to complex environmental challenges by applying theoretical principles and research methodologies at the forefront of the discipline.

Course Code:	CIVL6785	Course Title:	Municipal Distribution and Collection Systems
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course provides specialized and advanced knowledge on the design, operation, and management of municipal water distribution and wastewater collection systems. It emphasizes hydraulic analysis, system optimization, and sustainable infrastructure planning for urban water networks. Students will explore theoretical principles and computational modeling techniques for evaluating water distribution efficiency, pressure regulation, sewer hydraulics, and stormwater drainage. The course also integrates emerging research on smart water networks, resilience to climate change, and innovative water conservation strategies. Through case studies and independent research projects, students will develop critical thinking, problem-solving abilities, and professional judgment necessary to address complex urban water management challenges.

Course Code:	CIVL6725	Course Title:	Physical-Chemical- Biological Treatment Processes
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advanced graduate-level course explores specialized knowledge in water and wastewater's physical, chemical, and biological treatment processes. It emphasizes advanced concepts, research methodologies, and innovative technologies to address complex and emerging issues in environmental engineering. Students will critically analyze and design integrated treatment systems, utilizing advanced skills in process kinetics, operational challenges, and mitigation strategies. Topics include process kinetics, working principles, design criteria, operational challenges, and mitigation strategies for key unit operations such as coagulation, flocculation, sedimentation, filtration, disinfection, activated sludge systems, trickling filters, membrane bioreactors, ion exchange, electro-dialysis, reverse osmosis, and microbial fuel cells. The course promotes interdisciplinary approaches and ethical professional practices for process design and optimization, fostering analytical, problem-solving, sustainable engineering practices, and lifelong learning to prepare students for leadership roles in water and wastewater treatment fields.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL6750	Course Title:	Air Pollution Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course provides advanced insights into the technical, regulatory, and environmental aspects of air pollution. It covers pollutant sources, atmospheric transport mechanisms, health impacts, monitoring methods, and control technologies. Emphasis is placed on collaborative and experiential learning to develop practical skills in air pollution engineering, with a focus on addressing current challenges through innovative and solution-oriented approaches.

Course Code:	CIVL6760	Course Title:	Solid Waste Management
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course provides a highly specialized understanding of the types, sources, and characteristics of solid wastes and sludges, including hazardous wastes, with a critical focus on their physical and chemical properties. Students will explore engineered systems for solid waste management, covering generation, on-site handling, storage, processing, recycling, collection, transfer, and transportation, with critical awareness of emerging issues and innovations in the field. Advanced processing techniques such as composting, biogas production, incineration, and ultimate disposal methods are critically evaluated in light of current research, new developments, and sustainability challenges. The course emphasizes applying innovative solutions and synthesizing knowledge from related professional areas to manage solid waste effectively in complex and dynamic environmental contexts.

Course Code:	CIVL6935	Course Title:	Surface Water Hydrology
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course provides mathematical and practical tools to study and analyse hydrological sub-system dealing with surface water and its interaction with subsurface sub-system. Hydrologic processes; governing equations, atmospheric water, subsurface water, surface water, Hydrologic analysis; unit hydrograph, lumped flow routing and distributed flow routing, Basic knowledge of computer software available for the relevant topics.

Course Code:	CIVL 6970	Course Title:	Environmental Impact Assessment
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course identifies the impact of water resources projects on environmental quality. It also provides methods of assessment and management, data analysis; data Interpretation techniques and report writing for water & environmental Projects.

Course Code:	CIVL6770	Course Title:	Advanced Wastewater Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advanced course is oriented towards physical, biological, and advanced treatment of wastewater, The course covers topics such as physical unit operations and design, biological unit processes, design of facilities for the biological treatment of wastewater, advanced wastewater treatment, design of facilities for the treatment and disposal of sludge.

Course Code:	CIVL6700	Course Title:	Special Topics in Environmental Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

A very well-structured advanced course in the area of Environmental Engineering covering a topic which is not offered in any other course approved by Department Council.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL6735	Course Title:	Membrane Treatment Process Modelling
No. of credit hours:	3	No. of contact hours:	3

A short description:

This is an advanced graduate course on the modelling, simulations and design of membrane technology for water and wastewater treatment. The course will cover the topics including understanding of membrane processes, membrane materials and their properties, transport phenomena through membranes, i.e., concentration-polarization and fouling, and developing the mathematical model of dead-end and crossflow membrane processes. Finally, the design and implementation of membrane treatment process for reverse osmosis and membrane bioreactor will be discussed.

Course Code:	CIVL6380	Course Title:	Geoenvironmental Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course exposes the engineering students to environmental problems related to soils and groundwater contamination. It covers the engineering properties and chemical composition of soils, clay mineralogy and structure, soil hydraulic conductivity, groundwater flow, contaminant transport in porous media, investigation and characterization of contaminated sites, remediation processes, beneficial use of cleaned soil for construction, containment of waste and landfills. Remediation of groundwater. The student will know how to integrate basic engineering disciplines (soil mechanics, transport in porous media, physics and chemistry) to address the geoenvironmental problems.

Course Code:	CIVL7003	Course Title:	Research Thesis
No. of credit hours:	6	No. of contact hours:	

A short description:

The research work extends for at least 2 semesters. The selection of a thesis topic is the responsibility of the student and the advisor. The project should involve the systematic investigation of a significant and timely topic. Synopsis must be submitted at the beginning of the project. Students are required to present their progress in the form of seminars. At the end, a project report must be prepared and submitted according to guidelines.

• **MSc. in Civil Engineering (Water Resources)**

Course Description

Course Code:	CIVL6785	Course Title:	Municipal Distribution and Collection Systems
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course provides specialized and advanced knowledge on the design, operation, and management of municipal water distribution and wastewater collection systems. It emphasizes hydraulic analysis, system optimization, and sustainable infrastructure planning for urban water networks. Students will explore theoretical principles and computational modeling techniques for evaluating water distribution efficiency, pressure regulation, sewer hydraulics, and stormwater drainage. The course also integrates emerging research on smart water networks, resilience to climate change, and innovative water conservation strategies. Through case studies and independent research projects, students will develop critical thinking, problem-solving abilities, and professional judgment necessary to address complex urban water management challenges.

Course Code:	CIVL 6925	Course Title:	Groundwater Hydraulics
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advanced graduate-level course explores specialized knowledge in water and wastewater's physical, chemical, and biological treatment processes. It emphasizes advanced concepts, research methodologies, and innovative technologies to address complex and emerging issues in environmental engineering. Students will critically analyze and design integrated treatment systems, utilizing advanced skills in process kinetics, operational challenges, and mitigation strategies. Topics include process kinetics, working principles, design criteria, operational challenges, and mitigation strategies for key unit operations such as coagulation, flocculation, sedimentation, filtration, disinfection, activated sludge systems, trickling filters, membrane bioreactors, ion exchange, electro-dialysis, reverse osmosis, and microbial fuel cells. The course promotes interdisciplinary approaches and ethical professional practices for process design and optimization, fostering analytical, problem-solving, sustainable engineering practices, and lifelong learning to prepare students for leadership roles in water and wastewater treatment fields.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL 6935	Course Title:	Surface Water Hydrology
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course provides mathematical and practical tools to study and analyse hydrological sub-system dealing with surface water and its interaction with subsurface sub-system. Hydrologic processes; governing equations, atmospheric water, subsurface water, surface water, Hydrologic analysis; unit hydrograph, lumped flow routing and distributed flow routing, Basic knowledge of computer software available for the relevant topics.

Course Code:	CIVL 6780	Course Title:	Contaminant Transport Processes
No. of credit hours:	3	No. of contact hours:	3

A short description:

This postgraduate-level course, "Contaminant Transport Processes," is integral to the Environmental Engineering Program and explores the advanced principles of contaminant dynamics in the environment. Emphasizing highly specialized knowledge, the course examines the mechanisms of contaminant dispersion across air, soil, and water (including surface water and groundwater) and their interactions between media. Students will critically analyze dominant transport mechanisms, derive equations to quantify these mechanisms, and develop innovative solutions to complex environmental challenges by applying theoretical principles and research methodologies at the forefront of the discipline.

Course Code:	CIVL6915	Course Title:	Stochastic Hydrology
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course introduces the advanced application of statistics and probability, through a combination of theory and applications, to the fields of surface and groundwater hydrology, water resources, and environmental engineering. The topics covered in this course include: review of probability theory, statistical characteristics of hydrologic and environmental time series, frequency analysis of events, univariate time series modeling, multivariate time series modeling, disaggregation modeling, linear transfer function models, long-term stochastic processes and phenomena, characterization of temporal and spatial variability, uncertainty in hydrologic, environmental, and water resources modeling.

Course Code:	CIVL6940	Course Title:	Advanced Water Resources Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course provides principles of water resources engineering systems. These include surface and groundwater, open and closed conduits, hydraulic machinery, probability and economics in engineering and waste waters.

Course Code:	CIVL6945	Course Title:	Advanced Hydraulic Structures
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advanced course covers different applications of hydraulic structures such as applications in pipe and open channel flow and other hydraulic structures. Unsteady flow in pipes, Water hammer, Hydraulics of sediment transport, Spillway and design of dams.

Course Code:	CIVL6950	Course Title:	Water Resources Planning and Management
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course is designed to provide students with concepts and methods of water resources planning and management. Water project Management; organization; decision theory and water laws.

Course Code:	CIVL7003	Course Title:	Research Thesis
No. of credit hours:	6	No. of contact hours:	

A short description:

The research work extends for at least 2 semesters. The selection of a thesis topic is the responsibility of the student and the advisor. The project should involve the systematic investigation of a significant and timely topic. Synopsis must be submitted at the beginning of the project. Students are required to present their progress in the form of seminars. At the end, a project report must be prepared and submitted according to guidelines.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

• MSc. in Civil Engineering (Construction Engineering and Management)

Course Description

Course Code:	CIVL6010	Course Title:	Construction Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course aims to disseminate knowledge about construction engineering specifically that related to the construction site and operations which includes: (1) design of temporary structures (shuttering forms, scaffolding system, sheet piling system, support systems for deep excavation, dewatering system,), (2) rock blasting operations, (3) calculation and planning of a number of equipment and manpower required for different operations at the construction site.

Course Code:	CIVL6020	Course Title:	Advanced Administration of Construction Contracts
No. of credit hours:	3	No. of contact hours:	3

A short description:

This major required, three credit hours MSc advanced course covers review of the fundamentals of construction projects management and administration. It aims to deliver knowledge in the area of contract administration in construction projects. This course introduces definition of a construction contract, types of contracts, delivery methods, claims definition, claims settlement, dispute resolution, payments certification process etc. Students conduct in-depth studies on administrative and legal concepts about contracts in construction projects. Contract's standard terms and conditions are considered in this course. Comparison between the Standard Contract for Building and Civil Engineering Works, May 2019-R.1 and the General FIDIC or other Constructions contracts is made through the students' project including report and presentation.

Course Code:	CIVL6030	Course Title:	Construction Project Management
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course aims to provide a background about the framework of the management of construction projects. Project management aspects covered in this course include schedule, cost, resources and risk. It introduces students to the concepts and techniques related to the planning and control of construction projects.

Course Code:	CIVL6040	Course Title:	Research Methods and Simulation
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course aims to introduce the application of computer in construction engineering and management. It introduces different concepts in simulation and modelling, and present the major processes in simulation and modelling that data collection, input modelling, process modelling and data validation.

Course Code:	CIVL6050	Course Title:	Occupational Health and Safety in Construction
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course introduces the principals of occupational health and safety in construction projects such as safety engineering, occupational safety and health management systems, and causes of incidents in construction projects and preventive methods. The course also covers some available local case studies on the HSE.

Course Code:	CIVL6060	Course Title:	Construction Cost Estimation
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course introduces students to the construction cost estimating and the bidding process in general. The course emphasizes the breakdown of the project work scope to work items and performing quantity take-off for each item. The course focuses on the direct cost components of material, equipment, labor, and subcontractor to estimate the unit cost of the work items. The course familiarizes students with the procedures to determine overhead expenses and project profit.

Course Code:	CIVL6080	Course Title:	Project Quality Management
No. of credit hours:	3	No. of contact hours:	3

A short description:

The focus of this course is to provide a deep knowledge in the three major areas in quality management: (1) quality management plan (the assurance of application of Construction Project Management principals), (2) quality assurance (the assurance that the system is designed properly to provide the required quality), and (3) quality control (the identification of product problems, analysis, and applying corrective measures).

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL6095	Course Title:	Special Topic in Construction Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course is comprised of two components, i.e., the first that covers aspects on special topics utilized within the Construction Engineering and Management [CEM] domain, and a second that covers aspects related to research within the CEM domain and the research process and research in general. The course aims at ensuring that students have required competencies in the various advanced special topics, their application in the solution of legacy and contemporary CEM research problems, an appreciation of the research process and research platforms, e.g., research databases, publishers, Journals, articles, authors, etc.

Course Code:	CIVL6090	Course Title:	Value Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course aims to provide a comprehensive overview of the area of value engineering. It represents the three fundamental concepts of value engineering which are: function, cost and worth. It also introduces the logical process of value engineering (selection, investigation, creative, evaluation, development, presentation, and implementation). Value engineering concepts and processes are discussed and introduced in view of the project design and construction.

Course Code:	CIVL6070	Course Title:	Computer Applications in Construction
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course is intended to build student's competencies in discrete event simulation modeling, i.e., problem abstraction, process interaction modeling, input modeling, output analysis. On successful completion, students should be able to solve complex, stochastic research and industry problems within the construction domain such as costing, scheduling, claims analysis, etc.

Course Code:	CIVL7003	Course Title:	Research Thesis
No. of credit hours:	6	No. of contact hours:	

A short description:

The research work extends for at least 2 semesters. The selection of a thesis topic is the responsibility of the student and the advisor. The project should involve the systematic investigation of a significant and timely topic. Synopsis must be submitted at the beginning of the project. Students are required to present their progress in the form of seminars. At the end, a project report must be prepared and submitted according to guidelines.

• MSc. in Civil Engineering (Geomatics Engineering)

Course Description

Course Code:	CIVL6400	Course Title:	Advanced Remote Sensing
No. of credit hours:	3	No. of contact hours:	3

A short description:

Electromagnetic spectrum, energy interactions with the atmosphere and earth surface. Sensors and recording devices in the visible, near visible, thermal, and microwave bands. Earth borne, airborne and satellite platforms. Digital image processing: geometric and radiometric rectification, image enhancement, classification and pattern recognition algorithms. Integration of ground truth data. Case studies using digital data sets, ground truth and commercial software. Applications in building maintenance, process control, environmental monitoring and mapping.

Course Code:	CIVL6511	Course Title:	Principles of GIS
No. of credit hours:	3	No. of contact hours:	3

A short description:

Principles, structures, procedures and applications of geographic information systems and science. Practical experience in the analytical treatment of geographical information, including information sources; data storage, representation and visualization; projections and coordinate systems; and the analysis of spatial data to generate new information.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL6711	Course Title:	Geodesy and Map Projection
No. of credit hours:	3	No. of contact hours:	3

A short description:

Spherical trigonometry and astronomic positioning; gravity fields, the geoid, ellipsoid, sphere and plane surfaces with curvilinear and Cartesian coordinates and their transformations; fundamental problems of geodesy, spatial analysis of map projection attributes of equal area, equal distance, equal azimuth and conformality. Conformal mapping of the ellipsoid to a plane using Mercator, Transverse Mercator, Lambert and stereographic projections. Global and local projections.

Course Code:	CIVL7303	Course Title:	Research Thesis
No. of credit hours:	6	No. of contact hours:	

A short description:

The research work extends for at least 2 semesters. The selection of a thesis topic is the responsibility of the student and the advisor. The project should involve the systematic investigation of a significant and timely topic. Synopsis must be submitted at the beginning of the project. Students are required to present their progress in the form of seminars. At the end, a project report must be prepared and submitted according to guidelines.

Course Code:	CIVL6111	Course Title:	GPS Theory and Applications
No. of credit hours:	3	No. of contact hours:	3

A short description:

Fundamental concept of satellite positioning, the GPS components (satellite, ground and user segments), field planning and office procedures for GPS surveying, GPS instrumentation, GPS observables and modeling, data processing for single point positioning, differential positioning and precise relative positioning. Integer ambiguity resolution. Introduction to modern GPS surveying techniques, real-time and post processed baseline solutions, adjustment of baselines within networks, datum transformations and height determination. Applications to GPS surveying. Integration of GPS with GIS. Status and future trends of GPS positioning.

Course Code:	CIVL6450	Course Title:	Advanced Surveying
No. of credit hours:	3	No. of contact hours:	3

A short description:

Advanced horizontal and vertical distance measurements, advanced topics in traverse and other methods for horizontal positioning, introduction to astronomy, modern surveying and mapping using Global Positioning System (GPS). Control and topographic surveying, route surveying, construction surveying, and land surveying.

Course Code:	CIVL6911	Course Title:	Geomatics Project Management
No. of credit hours:	3	No. of contact hours:	3

A short description:

Introduction to geomatics project management. Basic project management concepts. Initiating geomatics projects. geomatics project planning. The geomatics project plan. Scope definition and the work breakdown structure. Time and project schedule. Cost management and project budget. People in the geomatics project: stakeholders; the project team. Planning other geomatics project components: risk, quality, communications, procurement. Project execution: managing work, quality, communications, and procurement. Project control: tracking progress, monitoring change. Project closure.

Course Code:	CIVL6200	Course Title:	Application of Remote Sensing and GIS
No. of credit hours:	3	No. of contact hours:	3

A short description:

Characteristics of high-resolution space-borne remote sensing systems and their applications for the mapping and analysis of complex urban scenes. Major topics include overview of high-resolution satellite remote sensors, multi-sensor data fusion, knowledge-based image analysis, photogrammetric processing of satellite images for 3D object extraction, intelligent change detection systems, and integration of remote sensing and 3D urban GIS. Selected case studies in land-use/land-cover mapping, human settlement management and environmental impact analysis will be addressed.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	CIVL6311	Course Title:	Data Adjustment
No. of credit hours:	3	No. of contact hours:	3

A short description:

Scope, aim, limitations and methodology of determining the most probable values of observables and unknown parameters by over determination of data. Concept of correlation, weights, weight coefficients and variance-covariances. Least squares solutions of linear and non-linear mathematical models by parametric, condition and combined methods. Problem formulation and solution: weighting unknown parameters; splitting and constraining unknowns; combining different normal equations and mathematical models; addition and rejection of observations; adjustment in phases and introduction to sequential adjustment.

Course Code:	CIVL6600	Course Title:	Photogrammetry
No. of credit hours:	3	No. of contact hours:	3

A short description:

Historical perspective. Mathematical fundamentals of analytical photogrammetry. Use of mono and stereocomparators with computers for photogrammetric problems such as calibration image coordinate refinement, space coordinate transformations, relative and absolute orientation, space resection and intersection, aerial triangulation and block adjustments, and computerized mapping techniques. Photo mosaicing; DEM generation; orthorectification; aerotriangulation; photogrammetric project planning.

Course Code:	CIVL6800	Course Title:	Advanced Photogrammetry
No. of credit hours:	3	No. of contact hours:	3

A short description:

In-depth treatment of various topics such as non-conventional photogrammetry, orthophotography and rectification, cameras and auxiliary instrumentation, the physical aspects of aerial photography, testing and calibration of photogrammetric instruments, and analytical plotters

• MSc. in Architectural Engineering

Course Description

Course Code:	AREN6101	Course Title:	Sustainable Architectural Engineering Design
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course focuses on the green building design procedure, key principles and engineering approaches, and sustainability assessment methods. Advanced architectural engineering design concepts and methods will be applied to energy-efficient and environmentally responsive designs. The course emphasizes both a comprehensive understanding and practical applications of sustainable building design strategies and critical examination of the major international sustainability rating. The prevailing building simulation tools will be used during the course.

Course Code:	AREN6102	Course Title:	Advanced Building Systems Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course aims to develop and deepen students' knowledge in the areas of building systems engineering including architectural systems, mechanical, electrical and plumbing (MEP) systems, renewable and sustainable energy systems. It attempts to raise student's awareness of how to apply scientific methods and state-of-the-art technologies in order to address the multi-faceted challenges in sustainable buildings.

Course Code:	AREN6103	Course Title:	Sustainable Building Construction
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course helps to set the stage for student understanding of sustainable building construction: its origins and engineering principles as well as an overview of current design and construction delivery systems for green buildings. Special reference will be given to green building rating systems such as LEED and BREAM.

ACADEMIC DEPARTMENTS

CIVIL AND ARCHITECTURAL ENGINEERING

Course Code:	AREN7001	Course Title:	Research Thesis
No. of credit hours:	6	No. of contact hours:	0

A short description:

The Research Thesis involves systematic investigation of a significant and timely topic related to the student's area of interest. The selection of a thesis topic is the responsibility of the student and the advisor. The research thesis could be based on, but not limited to, literature review and analysis; case-study critic and analysis; analysis of secondary data; or empirical data collection and analysis. The work for the Research thesis extends for at least 2 semesters.

Course Code:	AREN6211	Course Title:	Sustainable Architectural Design in Hot Regions
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course introduces student to the concept of passive architectural design and links it to conceptual design of buildings that attain high sustainability standards compared with conventional buildings, through analysis of case studies of application in hot-climate regions. The course also introduces students to computer-based skills required for environmental sustainability analysis through related software. The course also allows students to apply the theoretical knowledge in design projects. The focus is on the applications of passive architectural design principals as a design motivator.

Course Code:	AREN6212	Course Title:	Human Factors of the built Environment
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course explores the relationship between built environments and human attitude, behaviour and well-being by introducing students to theory and methods used in designing psychologically-friendly building and urban spaces. It addresses issues such as how individuals and groups react to different environmental situations, how behaviour of people influences sustainability.

Course Code:	AREN6213	Course Title:	Urban Environmental Design
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course provides students with an understanding of the theory and practice of sustainable urban environmental design. The course draws upon ideas from both urban design and environmental planning disciplines. Students will explore the evolution of urban environmental design paradigm in the context of sustainable development of urban built-environment. They will also learn major challenges to urban environmental sustainability and explore alternative strategies for dealing with them through international case studies.

Course Code:	AREN6221	Course Title:	The Framework of Built Heritage Conservation
No. of credit hours:	3	No. of contact hours:	3

A short description:

This courses content is focused on the legal framework which guides the conservation of buildings and historical sites in Oman and the region. Particular consideration is given to the roles of all the organizations (local, regional and international) that operate within this framework, and how they interrelate. This course also forms the theoretical base to develop good judgments of the nature of interventions into our historic fabric; to improve the designer's ability to make such interventions with skill, and to underpin the practical techniques of conservation.

Course Code:	AREN6222	Course Title:	Materials and Technologies of Conservation in Hot Regions
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course addresses the practical conservation challenges of historic built-environments in Oman and the region. Subjects covered include: properties and characteristics of structural and non-structural materials, compatibility, performance requirements, repair and restoration processes and structural behaviour. Students will be able to identify decay mechanisms, and suggest methods of structural stability and innovative repair specifications by using appropriate technologies within acceptable norms of conservation.

ACADEMIC DEPARTMENTS

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Course Code:	AREN6231	Course Title:	Advanced Construction Technology and Building Materials
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course addresses recent developments in the area of construction materials and advanced mechanics of components incorporating innovative materials. It attempts to raise student's awareness of the role and contribution of advances construction technologies in promoting the provision of sustainable buildings and developments.

Course Code:	AREN6232	Course Title:	Building Information Management
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course focuses on the role and opportunities of improving the construction industry productivity and quality, with special emphasis on building information management technology. The course covers recent developments in the industry; and computation as a set of intellectual ideas and technologies in construction management through understanding of the shift from representation to virtual simulation models of the building that can be used for quantity take offs, design decisions, interference checking, construction document generation.

Course Code:	AREN6241	Course Title:	Computer Simulation of Building Energy Systems
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course introduces major simulation programs currently available for analysis of building energy loads and system performance. The course utilizes hourly simulation programs to develop capability of students for energy analysis in multi-zonal buildings. The course focuses more on the design of new buildings.

Course Code:	AREN6242	Course Title:	Energy Audit of Building Systems
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course covers the fundamental tools, procedures and engineering approaches to perform energy audit of building systems typically required for energy efficiency projects. The course will help students to analyse and measure the performance of HVAC systems, envelopes, lighting and hot water systems, and modifications to reduce energy use. Emphasizes on existing buildings.

Course Code:	AREN6251	Course Title:	Special Topic
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course deals with research and in-depth analysis pertaining to the built environment at the two scales: building and urban. The course contributes selected and special knowledge leading to the Research Thesis.

• PhD in Civil Engineering

Course Description

Course Code:	CIVIL8000	Course Title:	Ph.D. Thesis
No. of credit hours:	0	No. of contact hours:	

A short description:

To conduct original research work in Civil Engineering discipline (analytical/simulation/experimental or a combination) leading to an extension to the existing body of Knowledge in the field that is of significance to academia and industry. The research is conducted to fulfil the requirements of a doctoral thesis.

4.1.4 Labs and Workshops

The Department has well-equipped laboratories for both Civil and Architectural Engineering programs. These laboratories support teaching in all major facets of the two programs. The facilities are used for educational as well as research activities. The equipment/ instrumentation in the laboratories represent the latest advancement in the related fields. All laboratories are open from 08:00 am to 04:00 pm and are all provided with lab safety equipment.

The Department has the following laboratories/facilities:

1. Architectural Printing Laboratory
2. Building Construction Model-making Laboratory
3. Building Energy Laboratory
4. Construction Materials and Structures Laboratory
5. Environmental Engineering Laboratory
6. Geomatics Engineering Laboratory
7. Geotechnical Engineering Laboratory
8. Highway Materials Laboratory
9. Model Workshop
10. Surveying Laboratory



4.2 Department of Electrical and Computer Engineering (ECE)

4.2.1 Department Overview

The Department of Electrical and Computer Engineering (ECE) is committed to excellence in teaching, research, and community service. It strives to prepare graduates who are critical thinkers, innovative problem-solvers, and active contributors to a rapidly evolving technological society.

The Department offers accredited undergraduate and postgraduate programs, including the Bachelor of Engineering in Electrical and Computer Engineering and the Bachelor of Engineering in Mechatronics Engineering (offered in collaboration with the Department of Mechanical and Industrial Engineering). Both undergraduate programs are accredited by the Accreditation Board for Engineering and Technology (ABET). At the postgraduate level, the Department offers MSc and PhD programs in Electrical and Computer Engineering with multiple areas of specialization.

Research plays a vital role in the Department's mission. Faculty members are actively engaged in diverse research areas including unmanned vehicle systems, smart grids, renewable energy, robotics, embedded systems, biomedical devices, computer networks, and artificial intelligence. In 2024, the Department secured several internal and external research grants in collaboration with national agencies and industry partners. Postgraduate students are integrated into these efforts through thesis work and applied research projects.

The Department continuously enhances its curriculum by incorporating emerging technologies and maintaining modern teaching and research laboratories. In addition to academic excellence, the Department supports a vibrant student community through societies such as the IEEE Student Branch and the Mechatronics Society. It also organizes national events, including the Oman Competition for AI-Enhanced Drones, in partnership with the Ministry of Transport, Communications, and Information Technology.

Vision of the Department

To be among the leading and well-known departments of Electrical and Computer Engineering in the Gulf region and beyond.

Mission of the Department

To provide an outstanding education in electrical and computer engineering with a rich diversity of skills to contribute to the community's prosperity through professional services and research, and to prepare graduates capable of engaging in life-long learning for engineering practice with competence. The Department aims to:

1. Prepare highly qualified electrical and computer engineers in related specializations capable of assuming professional responsibilities and pursuing graduate studies.
2. Conduct scientific research and contribute to developing knowledge in the electrical and computer engineering fields.
3. Provide continuing education and disseminate engineering knowledge through conferences, short courses, workshops, consultations, and seminars.
4. Promote regional and international cooperation with universities, research institutions, and organizations.



4.2.2 Faculty and Staff



Dr. Ahmed Al-Maashri

Associate Professor, Head of the Department

Research Interests: AI, Unmanned Aerial Vehicles, Embedded Vision Systems, Hardware accelerators



Dr. Lazhar Khriji

Professor, Assistant Head of the Department

Research Interests: AI, IoT, Healthcare Systems, Telemedicine, Digital signal and image processing and analysis



Prof. Abdullah Al-Badi

Professor

Research Interests: Distributed generation, Power quality, Power system analysis, Power electronics and drives, Power Electronics, and Renewable Energy



Prof. Hadj Bourdouden

Professor

Research Interests: Telecom Systems Security, Vehicular Ad-hoc Networks (VANETs) and applications, Industrial Applications of Undammed Autonomous Vehicles, Industrial Control Systems Cybersecurity, Data Analytics, Computer Vision supported by AI, ML, DL., Data networks (Optical, Wired & Wireless), Renewable Energy systems



Prof. Abdulnasir Hossen

Professor, UNESCO Chair on Artificial Intelligence

Research Interests: AI in Medicine, Biomedical Signal Processing, AI in Education, Ethics of AI, Machine and Deep Learning



Dr. Amer Al-Hinai

Professor, Deputy Vice-Chancellor for Postgraduate Studies & Research

Research Interests: Smart grids, Distributed generation, Microgrids, Renewable energy systems, Hybrid energy systems, multi-agent control, Energy storage, Power system operation and planning



Dr. Joseph Jervase

Associate Professor

Research Interests: Microwave Antennas and Propagation



Dr. Arif Malik

Associate Professor

Research Interests: Integrated Resource Planning, Renewable Energy Economics and Planning, Demand-Side Management Planning, Power System Reliability and Planning



Dr. Faical Mnif

Associate Professor

Research Interests: Robotics, Control Theory and Applications, Autonomous Systems



Dr. Zia Nadir

Associate Professor

Research Interests: AI in Education, RF Communications Systems, Computational Electromagnetics, RF Electronics

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING



Dr. Hassan Yousef

Associate Professor

Research Interests: Nonlinear and Adaptive control, Intelligent control, Applications of control techniques to renewable energy systems



Dr. Muhammed Shafiq

Associate Professor

Research Interests: Intelligent control of mechatronic and robotic systems, Adaptive and robust control of nonlinear and chaotic systems, Neural network and machine learning-based control strategies, Control and modeling of soft actuators and rehabilitation robotics, Smart grid systems and energy-efficient technologies, VTOL (Vertical Take-Off and Landing) and omnidirectional mobile robot control, AI applications in industrial automation and environmental monitoring, AI-based medical cancer detection and classification systems assistance



Dr. Mustafa Mesbah

Associate Professor

Research Interests: Intelligent control systems, biomedical signal and image processing, machine learning applications, pattern recognition, non-stationary signal processing



Dr. Tariq Jamil

Associate Professor

Research Interests: Computer Architecture, Digital Design, Computer Arithmetic, Parallel Processing



Dr. Ahmed C. Ammari

Associate Professor

Research Interests: Embedded and Reconfigurable Systems for Low-Power and IoT Applications, Artificial Intelligence for Multimodal Learning and CrossDomain Applications, Wireless Power and Data Transfer for Implantable Medical Devices, Sustainable Energy and Green Cloud Optimizations



Dr. Jawhar Ghommam

Associate Professor

Research Interests: Guidance, Navigation and Cooperative Control of Multi-Autonomous Vehicles



Dr. Mohammed M. Bait-Suwailam

Associate Professor, Director of the Communication and Information Research Center

Research Interests: Applied Electromagnetics and Antenna Systems, Remote Sensing and Space Communications, AI



Dr. Dawood Al-Abri

Associate Professor

Research Interests: Computer Network, Network Security, Social Network



Dr. Nasser Jumaa Tarhuni

Associate Professor

Research Interests: Wireless and Mobile Networks Radio resource Management, Machine Learning applications in communications, Signal Processing applications in power systems



Dr. Rami Al-Hmouz

Associate Professor

Research Interests: Computational Intelligence, Fuzzy Modeling, Granular Computing

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING



Dr. Razzaqul Ahshan

Associate Professor

Research Interests: Microgrids and Smart Grids, Renewable Energy Integration and Power Electronics, Energy Management and Optimization, and Electric Machines, AI for Intelligent Power Systems



Dr. Hafiz Muhammad Asif

Associate Professor

Research Interests: Next-generation wireless communication systems, Visible Light Communication, Quantum Computing and Communication, Wireless networking, Channel coding, Computer networks



Dr. Muhammad Rizwan Mughal

Associate Professor

Research Interests: Artificial Intelligence and Machine Learning, Spacecraft Engineering, Embedded Systems and Internet of Things



Dr. Mohamed Eladawy

Associate Professor

Research Interests: Oil-flow electrification in power equipment, system overvoltages, impulse voltage generation and characterization, power transformer modeling, finite-element simulation of underground cables, surge arrester monitoring, distributed generator optimization, presaturated core fault current limiters (PCFCLs), and wireless power transfer



Dr. Majdi Mansouri

Associate Professor

Research Interests: Statistical Fault Diagnosis, Applied Mathematics and Statistics, Applied Machine Learning, Applied Deep Learning, Applied Artificial Intelligence, Statistical Signal Processing



Dr. Hassan Al-Lawati

Assistant Professor, Assistant Dean for Undergraduate Studies (ADUS)

Research Interests: Circularly Polarized Antennas, Dielectric Resonator Antennas, MIMO Antennas, Wearable Antennas, MIMO Antennas



Dr. Abdelsalam Elhaffar

Assistant Professor

Research Interests: Power System Protection, Smart Grids and Distributed Generation, AI Applications in Electrical Systems



Dr. Sayyid Samir Al Busaidi

Assistant Professor

Research Interests: Communications and Signal Processing



Dr. Ibrahim Al Naimi

Assistant Professor

Research Interests: Smart homes and energy managements, Modeling, identification, and real time control, Sensor technology and sensor fusion, Fault detection in 3-phase power systems, Robotics and AI, Human tracking and identification



Dr. Gulam Khan

Assistant Professor

Research Interests: Networked control systems, event-driven systems, closed-architecture robotic systems, and micromanipulation manipulation

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING



Dr. Said Al-Abri

Assistant Professor

Research Interest: Data-Driven Planning and Control, Multi-Agent Systems and Swarm Robotics, Active Perception and Environmental Mapping, Bio-Inspired Distributed Autonomy, Derivative-Free Optimization Algorithms



Dr. Waseem Iqbal

Assistant Professor

Research Interest: Network/Computer Security, IoT/Security, Digital Forensics, Cryptography, Machine Learning for Cyber Security



Dr. Taha Al Saadi

Assistant Professor

Research Interest: Control Systems



Engr. Salem Al-Hinai

Lecturer

Research Interests: Power System Analysis & Modeling, Renewable Energy Integration, Power Quality & Harmonics, Protection & Control Systems, Energy Efficiency & Demand-Side Management



Engr. Suleiman Al-Sinani

Engineer A

Department Superintendent



Engr. Jaber Al-Balushi
Senior Engineer B



Engr. Yousef Al-Shuaili
Senior Engineer B



Engr. Abbas Eissa Teirab
Engineer B



Dr. Nabil Hamza
Lab Supervisor C



Mr. Sami Al-Jaafari
Technician

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING



Engr. Rona George Allwyn
Engineer B



Engr. Naeema Al-Gaithi
Engineer B



Mrs. Salwa Al-Bahri
Technician C



Engr. Saud Badar Al Salmi
Engineer B



Engr. Abdulsallam Muslem Aloraimi
Engineer B



Engr. Wisal Juma Said Al-Dohani
Engineer B



Engr. Wadhah Salim Al Darii
Engineer



Mr. Said Al-Hajri
Technician B



Mrs. Amina Al-Balushi
Coordinate & Follow-Up & Archive Specialist



Mrs. Noora Al-Arafati
Coordinate & Follow-Up & Archive Specialist

4.2.3 Academic Programmes

• BSc in Electrical and Computer Engineering

Course Description

Course Code:	ECCE1000	Course Title:	Electricity Generation from Solar Photovoltaics (UE)
No. of credit hours:	2	No. of contact hours:	3

A short description:

This course covers fundamentals of DC and AC circuit analysis, introduction to renewable energy, solar photovoltaic types, storages, inverters, and system design and maintenance.

Course Code:	ECCE2000	Course Title:	Introduction to Artificial Intelligence
No. of credit hours:	2	No. of contact hours:	3

A short description:

Artificial Intelligence is the most important technology associated with the 4th Industrial revolution, which will change most of our fields in life, such as education, health, industry, services, and job markets. For this we need to work hard to fill the gaps and educate our new generation to have the required skills in new digital technologies and how to use in future.

This course covers fundamentals of Artificial Intelligence (AI) and its importance, different applications, AI ethics, AI tools, and specialized programming languages such as Python. The course also includes some practical applications of Internet of Things.

Course Code:	ECCE2016	Course Title:	Circuit Analysis (1)
No. of credit hours:	3	No. of contact hours:	4

A short description:

Electrical quantities and terminology used in electrical engineering. Methods and theorems used in DC analysis. DC and transient analysis of R, RC and RL circuits both manually and with SPICE simulator.

Course Code:	ECCE2017	Course Title:	Electric Circuit Analysis
No. of credit hours:	4	No. of contact hours:	5

A short description:

This course deals with both DC and AC circuit analysis, using manual techniques as well as computer simulators (CAD Tools). It includes: Electrical quantities and terminology used in electrical engineering, Methods and theorems used in circuit analysis, Transient analysis of RC, RL and RLC circuits, Phasor concept, AC Steady-state response, Average power and RMS values, and Three-phase circuits.

Course Code:	ECCE3006	Course Title:	Skills Training
No. of credit hours:	0	No. of contact hours:	35

A short description:

This course aims at preparing the students for training in professional environments. It exposes the student to "hands-on" training on tasks related to the student's specialization. The course covers key issues in skills development and training such as safety procedures, electronics prototyping and development of professional habits.

Course Code:	ECCE3015	Course Title:	Electrical Engineering Fundamentals
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to DC circuits, AC circuits, three-phase circuits, transformers, DC and AC machines. Basics of electronic devices and their applications.

Course Code:	ECCE3016	Course Title:	Circuit Analysis (2)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is the second part of a two-semester course in circuit analysis. The topics covered in this course deal with sinusoids, phasor concept, steady-state response, average power and RMS values, magnetically coupled circuits, three-phase circuits, complex frequency, resonance, and two-port networks

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE3022	Course Title:	Electromagnetics (1)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is the first part of a two-semester course in engineering electromagnetics that deals with static fields. Topics cover: Review of vector algebra, coordinate systems and transformation, vector calculus. Electrostatic Fields: Characteristics and Laws. Electric Fields in Materials, Electric Boundary Conditions, Magnetostatic Fields: Characteristics and Governing Laws, and Electrical Classification of Materials, Maxwell's Equations for Static Fields.

Course Code:	ECCE3036	Course Title:	Measurements and Instrumentation
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course, designed for the students of Electrical & Computer Engineering, covers instrument static and dynamic characteristics, measurement errors, statistical evaluation of measurement data, standards and calibration of instruments, principles of analog & digital voltmeters, single and three phase watt meters, instruments for measurement of frequency and phase, measurements of resistors using DC bridges and of capacitance, inductance and frequencies using AC bridges, classification and selection of transducers, data acquisition systems, A/D and D/A converters. The course includes a lab which provides basic background in measurements & instrumentation.

Course Code:	ECCE3038	Course Title:	Electrical Measurement and Instrumentation
No. of credit hours:	2	No. of contact hours:	3

A short description:

This course, designed for the students of Electrical & Computer Engineering, covers instrument static and dynamic characteristics, measurement errors, statistical evaluation of measurement data, standards and calibration of instruments, principles of digital voltmeters, measurements of resistors using DC bridges and of capacitance, inductance and frequencies using AC bridges, design principles of signal conditioning circuits, sensors and transducers. The course includes laboratory experiments to provide students with hands on experience in measurements & instrumentation.

Course Code:	ECCE3142	Course Title:	Signals and Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

Signals and systems characteristics and models. Systems defined by differential and difference equations, system modelling. Time and frequency-domain representation and analysis of continuous & discrete time signals and systems, Fourier series and Fourier transform, Laplace transform, z-transform. Investigation of the above concepts using MATLAB

Course Code:	ECCE3152	Course Title:	Electronics (1)
No. of credit hours:	3	No. of contact hours:	4

A short description:

Electronic devices (operational amplifiers, diodes, bipolar junction transistors and metal-oxide Semiconductor field-effect transistors). Techniques used for analyzing electronic devices and circuits both manually and with CAD tools like PSPICE simulator. Electronic circuits applications.

Course Code:	ECCE3153	Course Title:	Electronic Devices and Circuits
No. of credit hours:	3	No. of contact hours:	4

A short description:

Solid State Diodes (PN, photodiode, LED, Solar Cell) with applications, principles of operation of BJTs and MOSFETs, Two-Port Networks, Analog circuits: Op-Amp theory, Basic Op-Amp Circuits, Op-Amp Parameters, Comparators and Schmitt Triggers, Digital-to-Analog Converters. Analog-to-Digital Converters, Power Supplies, Solid State Transducers. Voltage-Controlled Oscillators and Function Generators. CAD tools for circuit simulation and design.

Course Code:	ECCE3206	Course Title:	Digital Logic Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an introductory course (3 credit-hours) in logic and digital design. Course topics cover number systems, Boolean algebra and logic gates, simplification of Boolean functions, combinational logic design, MSI and PLD components, sequential logic design, registers, counters, and the memory unit.

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ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE3256	Course Title:	New Trends in Information Technology
No. of credit hours:	1	No. of contact hours:	2

A short description:

Introduction to the revolution of Information Technology and recent new trends. Approaches, techniques, and applications in IT.

Course Code:	ECCE3258	Course Title:	Applied Engineering Programming
No. of credit hours:	1	No. of contact hours:	2

A short description:

This course aims to reinforce the programming and algorithmic concepts learned in COMP2002. The course is mainly practical based and run in labs. Students will learn to design flow charts and basic algorithms for engineering problems that involve, e.g., finding roots, solving linear equations, and curve fitting. The students will then translate their solutions into correctly-running programs using any appropriate programming tool in C, C++, MATLAB, or Java.

Course Code:	ECCE3352	Course Title:	Electrical Technology
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers fundamentals of Electric Energy Systems, Electric Energy Conversion, Transformers, Fundamentals of AC & DC Machines, Power Electronics and introduction to illumination

Course Code:	ECCE3430	Course Title:	Engineering System Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

In this course the students will be introduced to engineering design process. Topics include: introduction to engineering system design, customer requirements analysis, translation of customer requirements to system requirements/specifications, conceptual design, concept selection and testing methods, system synergistic design including detailed design of mechanical, electrical, electronics, and software subsystems, simulation and prototyping.

Course Code:	ECCE4005	Course Title:	Numerical Methods for Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the basics of numerical methods for the solution of applied problems in engineering. It concentrates on the mathematical analysis and implementation of basic numerical techniques. Topics relate to various numerical methods developed for solving linear/non linear equations, curve fitting and interpolation. This course also introduces students to numerical differentiation, integration and an introduction to solve first order ordinary and partial differential equations. The applications related to each topic in electrical engineering are also covered.

Course Code:	ECCE4009	Course Title:	Engineering Design and Professional Skills
No. of credit hours:	2	No. of contact hours:	3

A short description:

In this course students learn essential engineering skills that help them identify and effectively solve engineering design problems. Topics covered includes engineering design process, problem formulation, system requirements specification, system design and testing, engineering project management and economics issues and effective teamwork practices. In addition, ethical, safety, environmental, societal and global implications of engineering solutions as well as professional engineering practice will be addressed

Course Code:	ECCE4010	Course Title:	Engineering Design and Professional Ethics
No. of credit hours:	2	No. of contact hours:	3

A short description:

This course introduces students to the theory, concepts and practice of engineering design. It focuses on engineering design process, design tools, professional skills, and ethical issues. Problem identification, research, requirements specification, concept generation, design, prototyping, system integration and testing phases are covered in the engineering design process part. In design tools, important technical tools that are used in the design and implementation phases as well as engineering project management are considered. Essential professional skills as teamwork, communication and management skills are reinforced through team-based projects. Ethical issues and realistic constraints that impact engineering design projects realisation are also covered.

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ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE4022	Course Title:	Electromagnetics (2)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is the second part of two-semester course in engineering electromagnetic. Topics cover: Poisson's and Laplace equations, resistance and capacitance. Time varying fields and electromagnetic induction, Maxwell's equations. Electromagnetic wave propagation: Plane waves in conductors and in dielectrics; Power and the Pointing Vector; Wave polarization. Transmission lines.

Course Code:	ECCE4023	Course Title:	Engineering Electromagnetics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course provides the foundation of electromagnetic theory that deals with static and dynamic fields. Topics cover: review of vector algebra and calculus. Electrostatic fields in free-space and materials. Solution of Laplace's and Poisson's Equations, resistance and capacitance. Magnetostatic Fields in free-space and materials. Summary of Maxwell's Equations for Static Fields. Time-varying fields and electromagnetic induction, Maxwell's Equations for time-varying Fields. Transmission lines.

Course Code:	ECCE4080	Course Title:	Seminar and Field Work
No. of credit hours:	0	No. of contact hours:	0

A short description:

The goal of this course is to provide the students with general knowledge and skills encompassing a wide area, and also to present them with topics in the engineering field and business that might not be addressed in their degree plans and that can broaden their thinking skills. An example of the topics that might be covered are: ethics, safety, life-long learning, functioning in business organizations, CV preparation and interviews, communication and presentation skills, design issues, time management planning, privatization of electricity in Oman, E-government, creative enterprises (incubators), and global issues.

Course Code:	ECCE4082	Course Title:	Professional Skills
No. of credit hours:	1	No. of contact hours:	2

A short description:

The goal of this course is to provide the students with general knowledge and skills encompassing a wide area, and also to present them with topics in the engineering field and business that might not be addressed in their degree plans and that can broaden their thinking skills. The skills related to communication, professional and ethical responsibility, engineering within global, economic, environmental and societal context and knowledge of contemporary issues are presented in this course. An example of the topics that might be covered are: ethics, safety, life-long learning, functioning in business organizations, CV preparation and interviews, communication and presentation skills, time management planning, privatization of electricity in Oman, E-government, creative enterprises (incubators), and global issues.

Course Code:	ECCE4122	Course Title:	Principles of Analog and Digital Communications
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces principles of analog and digital communication systems. The following topics are covered in the course: basic analog AM, FM and PM modulation and demodulation, Sampling theorem, Pulse Code Modulation (PCM), Differential PCM (DPCM), Adaptive Differential PCM (ADPCM), Digital Multiplexing, Lines coding and Spectrum, Regenerative Repeaters, Pulse Shaping, Intersymbol Interference, Eye diagram, Zero forcing equalizers, Signal Space representation: Orthogonal space, Correlation of Signals, Digital Carrier Systems: ASK, PSK, FSK, QPSK, QAM, M-ary signaling. Applications in modern communication systems.

Course Code:	ECCE4124	Course Title:	Digital Communications
No. of credit hours:	4	No. of contact hours:	5

A short description:

Introduction to Digital Communications. Review of Probability Theory and Random Processes. Baseband Data Transmission: Baseband Signaling Schemes, Spectrum, and Error Performance. Intersymbol Interference and Signaling Over Band-limited Channels. Optimal Receivers for Binary Data Transmission. Digital Modulation: ASK, PSK, FSK, QPSK, OQPSK, and MSK Signaling. M-ary Signaling Techniques. Introduction to Channel coding and Information theory.

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Course Code:	ECCE4126	Course Title:	Principles of Digital Communications
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to Digital Communications. Review of Probability Theory and Random Processes. Baseband Data Transmission: Baseband Signaling Schemes, Spectrum, and Error Performance. Intersymbol Interference and Signaling Over Band-limited Channels. Optimal Receivers for Binary Data Transmission. Digital Modulation: ASK, PSK, FSK, QPSK, OQPSK, and MSK Signaling. M-ary Signaling Techniques. Introduction to Channel coding and Information theory.

Course Code:	ECCE4127	Course Title:	Advanced Digital Communications
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course provides the students with fundamental theoretical, practical and simulation concepts of digital communication systems. The course contents are: Introduction to Digital Communications. Review of Probability Theory and Random Processes. Review of basic Digital Modulation techniques: ASK, PSK, FSK. Differential modulation techniques, M-ary modulations (QPSK, OQPSK, QAM, etc.). Signal Space representation and constellation diagram. Performance Analysis of Digital Communication Systems in AWGN channels. Optimum linear detectors. Noncoherent detection of digital modulations. Introduction to Information theory. Channel coding: Block and convolutional coding. Spread Spectrum systems. Multicarrier and OFDM. Multiple Access techniques.

Course Code:	ECCE4142	Course Title:	Digital Signal Processing
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an introductory course to digital signal processing. It covers the following concepts: Sampling, Quantization and Coding of signals, Discrete Fourier Transform, Fast Fourier Transform (FFT), Spectral analysis, FIR and IIR filter design and implementations, Introduction to Adaptive and Multi-rate filters,

Introduction to Wavelet transform, DSP applications using modern simulation tools, Experimentation with DSP Boards and modern simulation tools.

Course Code:	ECCE4153	Course Title:	Modern Digital Electronics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course in electronics which deals with concept, analysis, design and testing of complex electronic circuits using integrated devices. Time and frequency response, Feedback and Oscillators, Power amplifiers, Electronic Display Devices, systems-on-chip applications, I/O boards, special purpose IC's, Optoelectronic devices, wireless circuits, Mobile systems electronics, etc. CAD tools for circuit simulation and design in addition to Lab projects.

Course Code:	ECCE4158	Course Title:	Electronics (2)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course in electronics which deals with concept, analysis and design of electronic circuits using discrete and integrated devices. Digital logic circuits. Switching response times of discrete devices and basic logic gates used in integrated digital circuits. Bode Plots. Feedbacks and Oscillators. Output Stages and Power amplifiers. Electronic Circuit Design and Applications. Labs on electronics circuits based on Diodes, Transistors, and Op Amps. CAD tools are used to analyze circuits.

Course Code:	ECCE4203	Course Title:	Advanced Logic Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

Design of synchronous asynchronous sequential circuits: Flow tables, races, and hazards. Algorithmic state machines. Combinational programmable logic devices. Programmable logic arrays. Sequential programmable logic devices. Design for testability.

Course Code:	ECCE4210	Course Title:	Power Electronics and Drives
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is a basic course in power electronics and electrical drives. It covers power semiconductor devices and converters, speed/torque characteristics of motors and loads, operating point, multi-quadrant operation, DC and AC motors steady state modelling, speed control and braking, semiconductor controlled DC and AC motor drives

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Course Code:	ECCE4213	Course Title:	Digital Electronics - Reliability and Testing
No. of credit hours:	3	No. of contact hours:	4

A short description:

Testing diodes and transistor logic circuits. Noise margins and fanout. MOS and CMOS devices. Applications in the design of combinational circuits and sequential circuits. Semiconductor memories. Fault models in digital circuits. Testing of digital circuits and memories.

Course Code:	ECCE4216	Course Title:	Machine Learning for Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course investigates machine-learning algorithms and utilizes them in solutions of real world engineering applications. It employs scientific principles, and the development of machine learning tools in the solutions of real-life, engineering problems. Learning approaches that include supervised and unsupervised methods are studied to come up with a well-suited solution to several engineering case studies.

Course Code:	ECCE4221	Course Title:	Systems of Smart Cities
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course will introduce the concept, framework and key technologies of smart cities in different fields as well as discuss the impacts and barriers for implementing the concept of smart cities. Throughout the course, students will not only learn the key technologies (IoT, Big Data, Smart City applications, Cloud/Edge Computing) in designing and implementing solutions for a smart and sustainable city, but also understand the challenges for implementing these solutions. Students are encouraged in critical thinking to adopt technological solutions to achieve smart and sustainable cities.

Course Code:	ECCE4227	Course Title:	Embedded Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an introductory course about microcontroller and its use in the design of embedded systems. Topics covered include hardware and software architectures of a microcontroller, assembly language programming for the microcontroller, and its application for a wide range of real-world applications.

Course Code:	ECCE4232	Course Title:	Introduction to Distributed and Parallel Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to distributed and parallel systems: Parallel processing mechanisms. Architectural classification schemes. Parallel computer structures. Principles of pipelining. Structures and algorithms for array processors. Multiprocessor architecture. Interconnection networks. Dataflow computers.

Course Code:	ECCE4237	Course Title:	Blockchain and Distributed Ledger Technology
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the technical principles and key concepts for Blockchain and Distributed Ledger Technology (DLT) such as design principles, public key cryptography, consensus algorithms, key blockchain networks and technologies, applications examples and practical application development, privacy, scalability, and policy issues.

Course Code:	ECCE4242	Course Title:	Introduction to Computer Networks
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces computer networks with emphasis on Internet architecture and protocols. Topics include packet and circuit switching, networking devices, network topologies, performance metrics, layered network architecture, networking models (OSI, TCP/IP). The course explores key issues and main protocols at the different networking layers including Internet applications (HTTP, DNS, DHCP, etc..), transport layer protocols (TCP, UDP), IP protocol, routing protocols, IP addressing and subnetting, IPv6, media access protocols, Ethernet, physical layer.

Course Code:	ECCE4252	Course Title:	Data Structure and Algorithms
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers fundamental concepts in data structure and algorithms. Topics covered include: lists, stacks, queues, heaps, trees, various searching and sorting algorithms. The performance of the various sorting methods are compared and analyzed.

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Course Code:	ECCE4253	Course Title:	Object Oriented Programming
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course provides necessary high-level skills and knowledge to develop modern Windows-based applications using object-oriented concept of programming. At the end of the course, students will be aware of software development tools and technologies, be able to write solid event-driven code using Visual Basic; create stand-alone, multiform applications and create effective interfaces.

Course Code:	ECCE4254	Course Title:	Operating Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

The goal of this course is to introduce student to key operating system services including process management, memory management, file system organization, disk and CPU scheduling, virtual memory, concurrent processing, protection and security. The course covers aspects of the DOS and Linux operating systems, C programming, and programs that communicate across a network.

Course Code:	ECCE4255	Course Title:	Applied Programming and Algorithms for Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

Fundamental concepts in data structure and algorithms applied to engineering problem solving. The course covers some essential data structure topics such as lists, stack and trees as well as basic algorithms such as sorting, searching, matching and few graph algorithms (e.g. shortest path). In lab sessions, the above topics are deployed in solving engineering problems for efficient implementation in C, C++ or JAVA.

Course Code:	ECCE4256	Course Title:	Engineering Design Issues and Professional Practices
No. of credit hours:	3	No. of contact hours:	4

A short description:

In this course students will learn essential engineering skills that will help them identify and effectively solve engineering design problems. Topics covered includes engineering design process, engineering project management and economics issues, effective teamwork, effective report writing and effective project presentation skills. In addition, ethical, safety, environmental, societal and political issues related to engineering as well as professional engineering practice will be addressed. Students will apply the skills learned in this course to their Final Year Project to improve it.

Course Code:	ECCE4257	Course Title:	Applied Algorithms for ECE
No. of credit hours:	3	No. of contact hours:	4

A short description:

Fundamental concepts in algorithms applied to engineering problem solving. The course covers some essential Algorithm topics such as sorting, searching, matching and few graph algorithms (e.g. shortest path and minimum spanning tree). In lab sessions, the above topics are employed in solving engineering problems and applications for efficient implementation in C, C++ or JAVA.

Course Code:	ECCE4263	Course Title:	Database Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

Concepts and principles of database management systems. Basic concepts. System structures. Data models, Database languages (SQL in particular). Relational database normalization. File systems. Indexing. Query processing. Concurrency control. Recovery schemes.

ACADEMIC DEPARTMENTS

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Course Code:	ECCE4272	Course Title:	Artificial Intelligence
No. of credit hours:	3	No. of contact hours:	4

A short description:

Fundamentals of automated reasoning in expert systems: Semantics and satisfaction, inference procedures, logical implication, proofs, unification, resolution, soundness and completeness. Searching strategies and problem solving. Limits of monotonic logic: forms of non-monotonic reasoning. The course includes a term project that consists of writing a small inference engine in Lisp.

Course Code:	ECCE4282	Course Title:	Coding and Data Encryption
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers modern cryptography and data security. The basic information theoretic and computational properties of classical and modern cryptographic systems are presented, followed by a cryptanalytic examination of several important systems. Application of cryptography to the security of electronic mail, timesharing systems, computer networks and data bases are studied.

Course Code:	ECCE4312	Course Title:	Power System Analysis (1)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course is designed to give the students an ability to model electric power system components and to analyze power system under steady-state conditions. The course contents include the following topics: Power system components. Transmission line parameters: Resistance, Inductance and capacitance. Model for short, medium, and long lines. Steady-state operation of transmission lines. Shunt and series compensation. Per unit systems. Bus admittance and impedance matrices. Symmetrical faults. An introduction to power-flow studies.

Course Code:	ECCE4316	Course Title:	Power System Analysis (2)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the following main topics in power system analysis. Power-flow studies, Symmetrical components. Symmetrical and Unsymmetrical faults. Transient stability: swing equation, equal-area criterion, time-domain simulation. Power systems economic dispatch.

Course Code:	ECCE4356	Course Title:	Electrical Machines (1)
No. of credit hours:	3	No. of contact hours:	4

A short description:

Theory of Basic Electrical Machines: D.C. machine Induction Machine , Synchronous Machine; Principle of Operation: DC and AC Machines; Equivalent Circuits, Parameters, Characteristics, Control, and Applications of the machines. Stepper motors.

Course Code:	ECCE4357	Course Title:	Electrical Machines (2)
No. of credit hours:	3	No. of contact hours:	4

A short description:

Synchronous Machines (motors as well as generators): Steady and Transient states; Effect of Saliency; Basic of Single-phase Induction generator; Special Motors: Reluctance Motor, Universal motor, and shaded pole motor.

Course Code:	ECCE4358	Course Title:	Electrical Machines
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course deals with energy conversion principle, three-phase power transformers and special types of transformers, single-phase and multi-phase induction motors, starting and control techniques, and induction generators (including doubly-fed type). It also covers synchronous machines that include winding construction, generator operation (including permanent magnet type), transient and subtransient reactance, operational limiting factors, starting and operation of synchronous motors, and special machines.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE4360	Course Title:	Renewable Energy Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course is offered to electrical and computer engineering students and provides an understanding of the fundamentals of renewable energy systems such as wind, solar, biomass, hydro, ocean, and geothermal and the socio-economic implications of sustainable energy. Then the students will learn the design and simulation of stand alone and grid connected renewable energy systems.

Course Code:	ECCE4361	Course Title:	Renewable Electricity Generation
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course includes global and local status and trends of renewable electricity power technologies with a focus on solar and wind power systems, energy storage technologies, green hydrogen and hydrogen cell, design of grid-connected and off-grid solar PV systems, the economic feasibility of renewable energy systems, the cost of energy form renewable energy systems, and introduction to the impacts of integrating renewable power resources on power systems.

Course Code:	ECCE4416	Course Title:	Linear Control Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to control systems. Mathematical modelling and representation of dynamical systems. Stability of control systems. Time domain analysis of control systems. Root-locus analysis of control systems. Time domain system performances. Root Locus-based techniques for compensators design (P,PI,PD, PID). Extensive use of computer aided analysis and design software. Analog controllers implementation.

Course Code:	ECCE4422	Course Title:	Digital Control Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course contains: Basic z-transform theory, Control loops with samplers, Discrete control loop analysis, stability analysis of digital control systems, Controller design for SISO systems, State space analysis and design of digital control systems. Introduction to discrete optimal time control systems. Implementation and Case studies.

Course Code:	ECCE4436	Course Title:	Industrial Control System Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

The topics of this course include A review of the basic technology and practice of process automation, including the P&ID diagrams, instrumentation and final control elements, plant, and process dynamics. Topics that cover all conventional control strategies used in industrial process control, including, feedback control, PID control, controller Tuning, cascade Tuning Ratio Control, feedforward control, on-off control, and introduction to modern control strategies like the model predictive control (MPC), and nonlinear control strategies. Active protection, safety, and risk analysis for the control process is also introduced, which includes Hazard analysis, Safety Integrity Levels (SIL). Case studies and worked examples on real Industrial process control systems.

Course Code:	ECCE4455	Course Title:	Sensors and Actuators
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces the fundamentals of sensors and actuator, their working principles, how to select them for a given application, and how to efficiently integrate them into an overall control system. The course is divided into two parts. The first part deals with sensors and covers: measurement system behaviour, analog and digital signal conditioning, sensors and transducers selection for system design, and integration of sensors and transducers in control systems. The second part concentrates on actuators and covers: electrical, hydraulic, and pneumatic actuators, the advantages and limitations, the selection and integration procedures. Learning activities include lectures, assignments, labs, and a design project.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE4456	Course Title:	Sensors and Sensor Systems Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course includes the following topics: Position, velocity and acceleration measurement. Force, torque and pressure measurement. Temperature and flow transducers. Electronic Devices and data conversion. Numerical Data acquisition systems; Classes of systems, data storage capacity, data storage capacity, data communications, data manipulation languages. Industrial systems.

Course Code:	ECCE4466	Course Title:	Power Electronics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is a basic introductory course in power electronics. It covers Power electronics devices. AC/DC conversion. AC/AC conversion. DC/DC conversion. DC/AC conversion. Application: DC drives, AC drives, conventional power supplies, switch mode power supplies.

Course Code:	ECCE4467	Course Title:	Power Electronics and Drive
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is a basic course in power electronics and electrical drives. It covers an introduction about power electronics and drives, Power semiconductor devices, Single-phase Rectifiers, Three-phase Rectifiers, Choppers (class A, B), Single- and three-phase Inverters, PWM techniques, Single-phase ac voltage controllers, DC and AC motor drives, and power electronics applications in renewable energy.

Course Code:	ECCE5001	Course Title:	Entrepreneurial Opportunities in Electrical and Computer
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course helps students to develop a creative, innovative and entrepreneurial approach through Project-Based Learning (PBL) in the specialization areas of Electrical and Computer Engineering (ECE).

The goal of this course is to develop a mental process, attitude, and behaviour to apply in evaluating and exploiting opportunities for value (manifested economically, explicitly or implicitly) in engineering students. Through this course, students also gain a thorough understanding of the recent advances in the field of Electrical and Computer Engineering. They identify current trends and formalize innovative approaches, which they need to take for solving ECE-related problems. This course will enable the students to make connections and conceive solutions to create value out of identified opportunities, and to learn how to develop a business proposal/plan.

Course Code:	ECCE5002	Course Title:	Selected Topics in Electrical and Computer Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the current state of the art in some of the hot areas of interest to student in the field of Electrical and Computer Engineering.

Course Code:	ECCE5004	Course Title:	Engineering Management and Economics (1)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course focuses on introducing to the engineering students a variety of tools and techniques in management & economics that can be used to facilitate the optimum utilization of manpower, materials, machines, money, and other resources.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5006	Course Title:	Biomedical Signal Processing
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course, a mixture of theory and practice, will give students a good understanding of the origins and characteristics of the mostly used physiological signals and provide them with the necessary tools to extract information from them. It covers a range of topics from data acquisition, to filtering, to analysis, to pattern recognition. A number of case studies and practical labs will be used to complement the lectures and give students opportunities to acquire and analyze real-life signals.

Course Code:	ECCE5007	Course Title:	Biomedical Instrumentation Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

Designing medical instruments, displacement sensors, temperature and optical sensors, amplifiers and signal processing, cell, nerve, and muscle potentials, electrocardiogram, electrode polarization, surface electrodes, electrocardiograph, power line interference, blood pressure sensors, heart sound sensors, blood flowmeters, impedance plethysmography, respiratory pressure and flow, respiratory gas concentration, blood-gas sensors, non-invasive blood gas sensors, clinical laboratory measurements, radiography, MRI, ultrasonic imaging, pacemakers and defibrillators, cardiac assist devices, electroshock hazards and protection.

Course Code:	ECCE5008	Course Title:	Project Management
No. of credit hours:	3	No. of contact hours:	4

A short description:

Management methods and techniques of projects in Government and private sector organizations. Introduction to project development. Phases of project planning and management. Budgeting and cost estimation. Resource allocation. Organizing, staffing and directing, Project management techniques. Project controlling and monitoring. Cost management. Risk analysis. Quality management.

Course Code:	ECCE5009	Course Title:	Project (Part 1)
No. of credit hours:	2	No. of contact hours:	3

A short description:

The final year project extends over two semesters, i.e., Part-I and Part-II. The tasks of the project are split in a way that the students could be evaluated in both the terms. The final year projects are normally design projects and should include standards and realistic constraints in their designs. These realistic constraints include economical, environmental, political, social, health, safety, manufacturability and sustainability etc. The standards are normally IEEE or IEC standards or even Omani standards, if they exist. Students are required to give a seminar to discuss the preliminary project results obtained in Part-I and submit a Part-I report as minimum.

Course Code:	ECCE5010	Course Title:	Engineering Economics and Project Management
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course has two units. The first unit deals with the fundamentals of engineering economics. The focus is on Time Value of Money, Interest Formulas, Inflation, Depreciation, and Project Evaluation Decision Models. The second unit covers fundamentals of project management, including planning, monitoring, scope, cost control, project life cycle, Work Breakdown Structures (WBS), Critical path analysis, Project Crashing, and Project Control.

Course Code:	ECCE5099	Course Title:	Project (Part 2)
No. of credit hours:	3	No. of contact hours:	4

A short description:

Part II of the final year project, which extends over two semesters. This part is a continuation of part I and it may include implementation of a prototype. Environmental impact of the project (if any) is addressed along with the cost analysis. Students are required to submit a final report and to give a presentation to discuss the outcomes of the project.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5112	Course Title:	Antennas and Wave Propagation
No. of credit hours:	3	No. of contact hours:	4

A short description:

Fundamental antenna parameters. Radiation pattern. Far-field, directivity. Radiation efficiency. Gain impedance. Bandwidth. Polarization. Antenna noise temperature. Friis power transmission formula. Basic types of antenna. Dipoles, arrays and long-wire antennas. Aperture-type antennas. Reflector antennas. Printed antennas. Propagation: electromagnetic wave propagation of various frequency ranges. Design of radio links.

Course Code:	ECCE5113	Course Title:	Antenna Theory and Radio wave Propagation
No. of credit hours:	3	No. of contact hours:	4

A short description:

Antennas: Classification of antennas based on structure, frequency, and wavelength. Antenna radiation regions. Antenna parameters and characteristics: radiation pattern; radiation resistance; directivity; gain; effective aperture; aperture efficiency; side-lobe-level (SLL); half-power beamwidth (HPBW); polarization; polarization loss factor (PLF); noise temperature. Practical antennas. Antenna arrays. Multiple-input multiple-output (MIMO) antenna systems

Propagation: Properties of electromagnetic wave propagation. Radio spectrum: VLF, LF, MF, HF, VHF, UHF, SHF and EHF. Millimeter waves (mmWave). Propagation mechanisms: Ground waves; Sky waves; Space waves. Friis transmission equation. Propagation attenuation models for free space, outdoor environments and indoor environments.

Course Code:	ECCE5114	Course Title:	Telecom Systems Security
No. of credit hours:	3	No. of contact hours:	4

A short description:

Telecom systems security refers to approaches carried out to safeguarding Telecom system devices, terminal equipment, routing equipment, servers and Wireless devices and networks against malicious attacks. It includes: Telecom Security Overview, Types of Attacks, Telecom Security Assessment, Addressing Telecom Network Vulnerabilities, Telecom Network Logical Structure, Telecom Wireless Network Security Overview, Authentication and Authorization, Encryption, Monitoring Telecom Wireless Network, case studies on Tools and techniques used for Telecom system security.

Course Code:	ECCE5122	Course Title:	Communication Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course deals with communication systems. Topics covered include the communication channel; digital signals and digital communication telephony: telex, facsimile, teletext; local area networks (LAN); integrated services digital network (ISDN); satellite communications.

Course Code:	ECCE5123	Course Title:	Optical Communications
No. of credit hours:	3	No. of contact hours:	4

A short description:

Comprehensive course of optical fiber communication that includes: application of EM in optical channel; structure; guided modes and types of fiber. Optical sources and detectors; optical signal modulations and physical devices. Fundamentals of direct detection and coherent receivers. Different optical fiber transmission links. System analysis and design with real life applications and performance analysis along with techniques of system enhancement. Focus on channel multiplexing for wavelength, time and OFDM. Optical fiber networks linked to next generation systems such as 5G and beyond. Metro and core networks; types of passive optical networks such as EPON and GPON

Course Code:	ECCE5124	Course Title:	Wireless Communications
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the following topics: Mobile system analysis and design including frequency reuse, Interference mitigation, cell splitting and sectoring, Trunking and Grade of Service. Wireless channel models including, path loss models, shadow fading, multipath channel models. Performance analysis over slow, flat fading Rayleigh channels. Review of digital modulation techniques for wireless systems. Equalization techniques. Diversity techniques. MIMO systems. Multiuser systems and Radio Resource Management. Basic architecture and operation of contemporary mobile communication systems. Introduction to Software defined radio.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5125	Course Title:	Advanced Communications Lab
No. of credit hours:	2	No. of contact hours:	3

A short description:

This course is divided into two, an experimental part and a student projects part that includes a presentation for each project. Topics covered in the experiments are microwaves, antennas, fiber optics, transmission lines and micro strips. While the project topics covers the full range of new technologies from within this highly dynamic field.

Course Code:	ECCE5128	Course Title:	Wireless Communications Network
No. of credit hours:	3	No. of contact hours:	4

A short description:

Review of wireless communications and networking. Understanding impact of mobility and connectivity provided by different wireless networks. Main wireless communications standards such as 2G, 3G, 4G, and 5G in addition to Bluetooth, WiFi, Zigbee and RFID. Key topics in wireless networking such as: Ad Hoc Wireless Networks and Sensor Networks; Self-organizing and adaptive networks; Cognitive Networks; Vehicular Ad Hoc Networks; Social Networks; Internet of Things (IoT); Role of Artificial Interference (AI) and Machine Learning (ML) in wireless communication networks.

Course Code:	ECCE5129	Course Title:	Information Theory and Data Communications
No. of credit hours:	3	No. of contact hours:	4

A short description:

Identify and explain the nature of communication data, concept of entropy, relative entropy and mutual information; Shannon's Theorems and its significance. Design source coding for data compression; noise in communications systems and its connection to channel capacity and mutual information, application methods to combat noise. Design channel coding for error correction; Design basic encryption/decryption algorithms to provide secrecy of information. Standard protocol architecture in data communication and basic components in a communication network. Identification of different topologies and design basic routing algorithms for data communication network.

Course Code:	ECCE5130	Course Title:	Modern Communications Systems Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

Topics may include: Introduction to microwave communication systems, Link budget, RF subsystems System modelling, Modulation formats and impact on circuit design, Distortion and spectral regrowth, Direct and heterodyne conversion, RF Integrated Circuits, Sub-system characterisation, System noise figure analysis, Impact of RF component design on wireless communication system performance, Radio propagation analysis as a system planning tool, Communications system architecture hardware analysis and design. Communications systems in the real-world.

Course Code:	ECCE5131	Course Title:	Digital Cellular Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

Effects of noise upon radio system behaviour and performance, radio wave propagation and math modelling. Methods used to combat the adverse effects of wireless propagation in communications systems, principles of mobile radio system design, analysis and evaluation of transceiver performance of a cellular radio system and predict the coverage of a base station transmitter. Development digital cellular systems; mainly operating principles and system architectures of 2G, 3G, 4G, 5G generation cellular systems, their advantages and disadvantages, and services they offer.

Course Code:	ECCE5132	Course Title:	Information Theory
No. of credit hours:	3	No. of contact hours:	4

A short description:

Information measures. Entropy. Mutual information Informational divergence. Noiseless codes and the noiseless coding theorem. Channel capacity for discrete and continuous channels. Randomly chosen code words. The noisy coding theorem. Error rate exponents. Computational cut-off rate and its application to digital communications.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5133	Course Title:	Satellite Communications
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims to introduce the fundamentals of satellite communications to the students. It covers topics like satellite orbits, propagations, link design, modulation, coding, multiple access techniques and some basic satellite systems.

Course Code:	ECCE5134	Course Title:	Selected Topics in Communications
No. of credit hours:	3	No. of contact hours:	4

T A short description:

This course covers the current state of the art in some of the hot areas of interest to student in the field of communication engineering.

Course Code:	ECCE5136	Course Title:	Error Control Coding
No. of credit hours:	3	No. of contact hours:	4

A short description:

Topics may include: Modern digital communication systems and digital data storage systems heavily use of error control coding. Communication receiver can detect and correct errors induced by channel impairments. High-speed networks employ Cyclic Redundancy Check (CRC) to ensure that data is transmitted accurately. This course will introduce basic theory and applications of error control coding (ECC). Theoretical background, linear block codes, low density parity check (LDPC) codes, cyclic codes , Reed-Solomon (RS) codes, Convolutional and Turbo codes. A number of applications of ECC in digital communications and digital data storage.

Course Code:	ECCE5142	Course Title:	Image and Video Processing
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to digital image processing, Digital image fundamentals, Image transforms, image enhancement, image restoration, image compression, color image processing, video coding, motion estimation.

Course Code:	ECCE5143	Course Title:	Advanced Digital Signal Processing
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course in digital signal processing. It covers the following topics: Multirate DSP (Interpolation and decimation; filter bank design; polyphase structures), Introduction to speech processing, Introduction to image processing, Introduction to image compression techniques, Machine Learning techniques to signal classification.

Course Code:	ECCE5152	Course Title:	Electronics Communication Circuits
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course deals with theoretical analysis, practical issues and simulation of communication circuits. Small signal amplifiers. Audio and video amplifiers. Oscillators. Resonant circuits; coupling tuned circuits; IF and RF amplifiers. Mixers; frequency conversion; modulators and detectors. Phase Locked Loops (PLL). Network noise and intermodulation distortion.

Course Code:	ECCE5160	Course Title:	Antenna Modelling and Measurement Techniques
No. of credit hours:	3	No. of contact hours:	4

A short description:

This Course covers the modelling aspects of standard wire and dielectric antennas, and addresses their fundamental characteristics, including impedance bandwidth, polarization, directivity, gain and radiation efficiency. The course structure is directed toward modelling of practical antennas for radio frequency and microwave engineering, with an emphasis on current modelling packages and measurement techniques. Practical measurements are conducted to validate the designed antennas. Both narrowband and broadband antennas as well as basic antenna arrays are considered. Modern antenna concepts in several engineering applications such as antenna miniaturization in smart phone, Multiple-Input-output (MIMO) systems are discussed.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5162	Course Title:	Microwave Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

Microwave components, devices, techniques and systems. Fundamental concepts of Maxwell's equations. Wave propagation. Network analysis and design principles. Applications of microwave engineering. Transmission line theory. Transmission lines and waveguides. Microwave network analysis. Impedance matching and tuning. Microwave resonators. Power dividers and directional couplers. Microwave systems.

Course Code:	ECCE5164	Course Title:	RF Communications Circuits
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims to provide students with the introduction of RF communications circuits design. The course covers the issues of RF circuit analysis & design; micro strip transmission line designing and analysis; S parameters; Couplers and filter design (Inter digital OCTL/SCTL type); oscillators; Modulators, Low noise and switching mode high efficient class E Power Amplifiers (PA) design, CMOS Power amplifiers design issues, RFs safety in designing and international standards, overview of state of the art fabrication techniques and applications, Computer aid of RF circuits using ADS.

Course Code:	ECCE5165	Course Title:	Mobile Communication Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the operation and design of mobile communication systems. The course is divided into two parts. The first part is an introduction to the basic techniques required by modern mobile communication systems. These include multiple access techniques such as code division multiple access CDMA, orthogonal frequency division multiplexing OFDM, and multiple input multiple output antenna systems MIMO. The second part of the course is dedicated to the study of deployed mobile communication systems such as GSM, UMTS, and LTE, i.e., from 2G to 4G mobile systems, their network structure, signalling formats, radio access technologies, air interface, and security. Computer labs give students hands on experience of simulating and assessing the performance of mobile communications.

Course Code:	ECCE5166	Course Title:	Introduction to Electromagnetic Interference and Compatibility
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces basic theory of electromagnetic interference (EMI) and electromagnetic compatibility (EMC) of today's electronic circuits and devices. The course also provides an in-depth knowledge of sources of EMI along with practical mitigation techniques such as filtering, grounding and shielding. Further, the course explains different EMI and EMC regulations and standards for certification of electronic devices such as smart meters.

Course Code:	ECCE5212	Course Title:	VLSI Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

Very Large Scale integrated (VLSI) circuit design. Provides a review of FET basics with Functional module design including combinational memory, combinational logic, programmable logic arrays and finite-state machines. Computer-aided VLSI fabrication techniques, layout strategies, scalable design rules, design-rule-checking and guidelines for testing and testability are covered along with. Survey of VLSI applications.

Course Code:	ECCE5213	Course Title:	Fault-Tolerant Computing Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course addresses design, modelling, analysis, and integration of hardware and software issues to achieve dependable computing systems employing on-line fault-tolerance. The course centres mainly around the concepts of Fault-Tolerant System Design based on: Redundancy, Reliability and Testing. It includes and covers the concepts of Dependability, Maintainability, Error Detection, Voting and Fault Diagnosis and their related models.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5214	Course Title:	Advanced Logic and Computer Interfacing
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course is designed to introduce the design of complex logic systems underlying or supporting the operation of computer systems and interfaces. Students will learn how to use advanced computer-aided design tools to develop and simulate logic systems consisting of MSI components such as adders, multiplexers, latches, and counters. The concept of synchronous logic is introduced through the design and implementation of Mealy and Moore machines. Hardware description languages are introduced and used to describe and implement combinational circuits. Students will also learn how to use programmable logic devices to implement customized designs.

Course Code:	ECCE5215	Course Title:	Computing Systems for Engineering Applications
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course where real-world examples and case studies from industry are covered to demonstrate to students the important up-to-date applications of computing systems in various engineering fields. Examples of applications are: consumer electronics, robotics, smart oil fields, networking and telecommunication.

Course Code:	ECCE5217	Course Title:	Reconfigurable Computing
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces Reconfigurable Computing (RC), and how to solve challenging and complex computational problems using RC. Field-Programmable Gate Array (FPGA) platforms are used to explore the potentials of RC. Basic building blocks of RC are discussed along with the architecture of Multi-FPGA systems. Evaluation of acceleration performance in terms of speed, power consumption, and cost. Computer-Aided Design (CAD) tools for FPGAs are discussed (compilers and High-level synthesis).

Course Code:	ECCE5218	Course Title:	Routing & Switching
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course focuses on Internet routing and LAN switching. The topics include: autonomous system, classification of routing protocols, routing hierarchy, popular routing protocols (e.g. RIP, OSPF, BGP, MPLS), VLAN, STP, SPB, TRILL, etc... In addition, it introduces students to recent routing and switching trends.

Course Code:	ECCE5219	Course Title:	Intelligent Applications in Robotics & Drones
No. of credit hours:	3	No. of contact hours:	4

A short description:

It is widely predicted that Robots and Drones will have a more visible role in our daily lives in the next decade. This course discusses several applications that blend Robotics and Drones with Artificial Intelligence. Students will be introduced to the basics of Robotics and Drones. Case studies will be explored in application domains such as industrial automation, precision agriculture, security, logistics, etc. Students will learn and develop algorithms that automate Robots and Drones and operate on data harvested by them.

Course Code:	ECCE5220	Course Title:	Artificial Intelligence Accelerators
No. of credit hours:	3	No. of contact hours:	4

A short description:

Artificial intelligence (AI) and machine learning (ML) can solve complex learning problems in diverse areas. These systems require high-performance computational resources to achieve desired performance levels. Consequently, hardware accelerators are typically employed to foster throughput performance. These accelerators are built using ASICs, FPGAs, GPUs, or the recent novel quantum accelerator resources. This course explores the available hardware accelerators for the AI and ML and provides hands-on experience in designing FPGA-based accelerators for convolutional neural networks (CNNs) as well as other AI architectures. More specifically, the course introduces High Level Synthesis (HLS) design methodology that automates the generation of HDL descriptions starting from a high level design entry. Students will learn a particular design flow that encapsulates AI frameworks and HLS to HDL methodology to create optimized AI hardware accelerators for various applications. Finally, a brief overview of quantum computing is explored as a novel alternative solution to AI acceleration.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5222	Course Title:	Microprocessor Interfacing
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is a senior level course, which covers various aspects of interfacing microprocessors with peripheral and memory devices. Topics include general structures of advanced microprocessors; static and dynamic memory interfaces; DMA controllers; interrupt controllers; memory management units interfaces to keyboard, disk and CRT; data communications interfaces.

Course Code:	ECCE5223	Course Title:	Advanced Embedded Systems Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course on the design of embedded systems for various real-world applications in a real-time operating system (RTOS) environment using variety of software and C/C++ programming languages. Applications studied include digital signal processing, industrial automation and control, computer networking, and consumer devices.

Course Code:	ECCE5224	Course Title:	Microprocessor Based Control Systems Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course treats the basic aspects of choice of architecture, technology - microprocessors; operations and timing diagrams; microprocessor simulator; designing and debugging of microprocessor based systems; required electronic circuits for building microprocessor based control systems; case studies.

Course Code:	ECCE5228	Course Title:	Cloud & Edge Computing Infrastructure
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course presents the core knowledge of cloud and edge computing infrastructure and provides hands-on experience in designing and employing comprehensive IoT and web applications on cloud and edge computing platforms. The course topics include cloud service models, cloud deployment models, fundamental components of cloud infrastructure, data management in the cloud, and case studies of cloud computing. It also covers an introduction to edge computing architectures, edge computing storage and network services, resource allocation in edge computing, deployment and management of applications on edge.

Course Code:	ECCE5229	Course Title:	Embedded Real Time Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course in the development of embedded systems; targeting multiple real-life applications. Applications include industrial automation and control, consumer electronics devices, computer networking, digital signal processing, etc. Through these applications, students will be exposed to different concepts such as Internet of Things and Embedded Operating Systems (e.g. Real-Time Operating System (RTOS) and Embedded Linux). Students will learn how to translate real world problems into engineering requirements with specific and realistic constraints and then prototype them onto embedded platforms.

Course Code:	ECCE5231	Course Title:	Industrial Networks and Operating Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

The first part of the course provides an introduction to operating system functions, Processes, CPU scheduling, single/multiuser OS, networking OS, and aspects of Linux OS as a case study. The course introduces fundamental concepts in the design and implementation of computer and industrial communication networks and their protocols. This includes introduction to OSI reference model, TCP/IP network protocol suite, HTTP, SMTP, FTP, DNS, TCP, UDP, IP, industrial network architecture, physical and logical characteristics of industrial networks, Ethernet and fieldbus technologies, common industrial protocol, and precision time protocol.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5232	Course Title:	Computer Architecture and Organization (1)
No. of credit hours:	3	No. of contact hours:	4

A short description:

Topics covered include central processing unit (control unit, arithmetic and logic unit, registers), memory (internal, external, cache), input/output and interfaces, RISC/CISC, pipelining, and introduction to parallel processing.

Course Code:	ECCE5233	Course Title:	Computer Architecture and Organization (2)
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is the second part of a two-semester course in computer architecture. Course topics include high speed arithmetic algorithms. Pipeline computers, multiprocessor systems, array and data flow computers, vector processors. Memory hierarchies, virtual memory, cache memory, input-output systems, DMA and interrupts.

Course Code:	ECCE5234	Course Title:	Industrial Systems Security
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers fundamental concepts of industrial automation and control systems (IACS) architecture, operations, security requirements, risk assessment, and constraints. The course topics include an overview of an Industrial control system, basic concepts of cybersecurity, industrial network design and architecture, industrial network protocols, risk and vulnerability assessments, malware detection, network attacks, IACS security implementation and access controls, and IACS security standard and practices.

Course Code:	ECCE5235	Course Title:	Advanced Computer Lab
No. of credit hours:	1	No. of contact hours:	2

A short description:

Programming and applications of microprocessors; interfacing: memory, I/O, ADC, DAC and UART; developments of microprocessors based systems and their testing.

Course Code:	ECCE5236	Course Title:	Practical Ethical Hacking
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces the students to the field of ethical hacking. Students will learn the techniques used to attack and compromise networks to better understand and identify the risks to corporate networks. The course covers different attack phases such as planning, reconnaissance, scanning, exploitation, and post- exploitation. The course also discusses techniques related to hacking industrial control systems and networks and the particularities of these systems and networks. The course will emphasize the practical side of ethical hacking.

Course Code:	ECCE5242	Course Title:	Advanced Computer Networks
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course on computer networks. The course emphasis is on topics related to routing and switching. These include: autonomous system, classification of routing protocols, popular routing protocols (e.g. RIP, OSPF, BGP), VLAN, STP, etc... In addition, it introduces students to recent and emerging networking technologies.

Course Code:	ECCE5243	Course Title:	Network Software Design and Programming
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course is aimed at exposing students to general aspects of network software design and programming. Related architectures and communication protocols including medium access, routing, congestion control, internetworking, connection issues and overview of Internet application protocols will be dealt with appropriate concepts of design the necessary software.

Course Code:	ECCE5245	Course Title:	Computer Laboratory
No. of credit hours:	2	No. of contact hours:	3

A short description:

Basic concepts and skills in networking environments. Packet analyzing of packet at Application, transport, network and data link layers. Socket programming. Network simulation. IP Address translation using Routers and Switches. Data Security.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5252	Course Title:	Software Engineering Practice
No. of credit hours:	3	No. of contact hours:	4

A short description:

Designing, development and commissioning of large software systems. Software life cycle. Requirements specification. Module decomposition. Module specification. Implementation and test planning. Software reliability and security. Multi-user environments. Project management issues. The course involves group project.

Course Code:	ECCE5253	Course Title:	JAVA Programming
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to the Java programming language. Concepts of procedural and object-oriented programming. Development of stand-alone applications and applets.

Course Code:	ECCE5263	Course Title:	Information Systems Analysis and Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

Information system development life cycle. User requirement analysis. Feasibility study. Cost/benefit Analysis. Systems analysis tools such as data flow diagrams. Process specification tools. Real time systems analysis. Transformation from analysis to design. Structured chart. System design quality heuristics. System design packaging and design optimization.

Course Code:	ECCE5265	Course Title:	Databases Engineering and Application
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course covers fundamental concepts of database systems towards developing real life database applications. Emphasis will be on analyzing, designing and implementing relational database systems. Concepts covered include entity-relationship model, normalization, structured query language (SQL), database management systems (DBMS) and database application development.

Course Code:	ECCE5282	Course Title:	Computer Network Security
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces basic computer network security concepts. Topics include: network security objectives and mechanisms, basic cryptography, attacks and countermeasures at various layers of networking protocol stack, and networking devices security.

Course Code:	ECCE5283	Course Title:	Cryptography, Security and E-Business
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course is serves as a broad introduction to cryptography and its application to computer-network security services and mechanisms, such as confidentiality, digital signature, access control, and electronic payments. Analysis of software and hardware implementations of cryptographic algorithms and network-security protocols are covered. Topics also include techniques for authentication, privacy, denial of service, and non-repudiation. Current Internet distributed security models and protocols are discussed in the context of these techniques. Of special importance are the application to Internet infrastructure protocols, such as Internet routing and transport protocols, as well as secure mail, directory and multimedia multicast services.

Course Code:	ECCE5284	Course Title:	Digital Forensics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the science, technology, procedures, and law of acquiring and analyzing digital evidence from computers and devices. The course topics include computer forensic and investigative security issues, legal impact of computer activity, computer crime, intellectual property, privacy issues, legal codes, the methods and standards for extraction, preservation, and deposition of legal evidence in a court of law. A hands on experience of different forensic tools is provided during lab session.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5291	Course Title:	Functional Verification of Hardware Designs
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces the basic concepts of hardware design verification. The course describes the methods, tools, and techniques that are essential to any verification engineer in order to validate complicated designs. In particular, the students will be trained to develop a verification plan based on the hardware specifications. Also, the course discusses the differences between simulation and synthesis HDL code; allowing students to write verifiable and synthesizable HDL code.

Course Code:	ECCE5292	Course Title:	Selected Topics in Computer Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the current state of the art in some of the hot areas of interest to student in the field of computer engineering.

Course Code:	ECCE5293	Course Title:	Embedded Vision Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course introduces the basics of embedded vision systems and its application domains. Basics of image processing and computer vision are covered. Machine vision algorithms and technologies. Embedded Systems and optimizations. Mapping machine vision to reconfigurable computing

Course Code:	ECCE5294	Course Title:	Introduction to Real Time Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces the students to the fundamental problems, concepts, and approaches in the design and analysis of real-time systems. Real time systems applications typically involve safety or mission critical systems where timing guarantees must be maintained. Real-time task model, design, dependability, communication, power and energy awareness, scheduling, and real-time control are some of the topics that will be covered.

Course Code:	ECCE5302	Course Title:	Power System Protection
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course provides students with basics of protection of electric power systems. Topics are: Conventional and non-conventional instrument transformers (ITs). Overcurrent protection, Differential protection, Distance protection, and Microgrid protection. Tripping and closing circuits design and troubleshooting. Testing of ITs & relays. Digital protection techniques dedicated to protecting lines, transformers, generators, busbars and motors.

Course Code:	ECCE5303	Course Title:	Power Distribution System Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the following main topics in Power Distribution System Eng. Load characteristics and its applications, Load forecasting, Types of distribution networks, Design of Distribution Substations, Selection of cables and distribution transformers, Voltage drop and voltage regulation, Design of distribution feeders. Power-factor correction, Smart meters, Automaton and SCADA, NEC, IEC standards, and microgrids.

Course Code:	ECCE5304	Course Title:	Power Stations
No. of credit hours:	3	No. of contact hours:	4

A short description:

Conventional and non-conventional power generation. Sources of energy. Types of power plants. Major equipment installed and layouts of different types of power stations. Environmental performance of power plants and the equipment installed to mitigate the environmental affects. Power plant costs, factors and definitions. Economic evaluation of power projects. Electricity trading and evolvement of electricity sector.

Course Code:	ECCE5312	Course Title:	Power Systems Stability and Control
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course on power systems stability and control. The course covers the following topics: Introduction to power system stability, Synchronous Machine Modelling, Excitation System Modelling, Turbine governor modelling, power System Control; Voltage and Frequency Control, Transient Stability Analysis, Small angle(Oscillatory) stability analysis, Voltage Stability Analysis, and Frequency Stability Analysis. FACTS Devices and their role in power system control and stability.

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ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5313	Course Title:	Electric Power Transmission Systems Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers transmission line structures and equipment, overhead power transmission, underground cables and GIL, limiting factors for EHV and UHV transmission, transmission line steady-state and transient operations, reactive compensation, substation types, maintenance, safety, and grounding, transmission interconnections and its importance, limitations of loading capability, power flow and dynamic stability, selection of shunt reactors and circuit breakers, types and applications of FACTS, HVDC technology, comparison of HVDC and FACTS, the electrical code.

Course Code:	ECCE5314	Course Title:	Selected Topics in Power
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers special topics in the field of electrical power systems engineering and sustainable energy.

Course Code:	ECCE5315	Course Title:	Smart Grid
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course covers essential topics in smart grid. The topics include an introduction to smart grid, smart-grid communications and measurement technologies, computational tools for smart grid design, integration of renewable and non-renewable distributed generations, smart metering and demand-Side Integration, applications to the power system at the generation, transmission, distribution, and supply levels, and the role of IoT in smart grid.

Course Code:	ECCE5316	Course Title:	Renewable Power Generation
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course is designed to give students up-to-date about renewable power generation; especially solar and wind technologies. The course includes global and local status of renewable power generation, resources and technologies, basics of renewable power generation economics, grid-connected and off-grid solar and wind power generation.

Course Code:	ECCE5317	Course Title:	Power Systems Stability and Control
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course on power systems stability and control. The course covers the following topics: Introduction to power system stability, Synchronous Machine Modelling, Excitation System Modelling, Turbine governor modelling, Power System Control; Voltage and Frequency Control, Transient Stability Analysis, Small angle (Oscillatory) stability analysis, Voltage Stability Analysis, and Frequency Stability Analysis. FACTS Devices and their role in power system control and stability.

Course Code:	ECCE5322	Course Title:	Electrical Power Systems Quality
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers Introduction to power quality, Terms and definitions, Causes, Analysis and Mitigation of Power quality problems. Topics covered include Voltage sags and interruptions, Transient overvoltage, Surges, Transient, Notching, Distortions, Unbalance, Frequency variations, Harmonics, Source of harmonics, Harmonics Mitigation, Harmonics filter design, Monitoring power quality, and Power quality standards.

Course Code:	ECCE5323	Course Title:	Power System Operation
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers economic dispatch of power generation units. Unit Commitments. Load frequency control. Interchange of power and energy. Power system security. Optimal power flow. An introduction to state estimation in the power system. Advanced topics in power system operations.

Course Code:	ECCE5324	Course Title:	Power System Reliability and Planning
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers an introduction to reliability engineering, basic concepts and power plant reliability, generation, transmission and distribution system reliability, reliability worth evaluation, capacity credits of renewable energy systems, energy production simulation, generation planning methodologies, demand-side management, integrated demand-supply planning including externalities, planning under competition, transmission planning, and cost-reflective electricity tariffs.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5332	Course Title:	High Voltage Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers importance and selection of HVAC and HVDC for power transmission, overvoltages and protective devices, insulation coordination, generation and measurement of high voltages and currents, online condition monitoring, aging and breakdown in gaseous, liquid and solid dielectrics, partial discharge, corona, circuit breakers and GIS, modelling and simulation of transient overvoltages, and application of IEC Standards for selecting and testing of HV equipment.

Course Code:	ECCE5333	Course Title:	Power System Economics
No. of credit hours:	3	No. of contact hours:	4

A short description:

The goal of this course is to provide the students with knowledge on the issues of electricity privatization, policy, regulation, and economic issues (competition, marketing restructuring, market power, wholesale and retailing, pricing mechanism, demand response, and demand-side management), the current arrangement of the electricity market in Sultanate of Oman.

Course Code:	ECCE5334	Course Title:	Modern Substation Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

Recent technological advancements have had a significant impact on every aspect of substation design and operation. This course will cover all aspects about HV/MV substations, including Gas Insulated Switchgear (GIS), substation design, automation, operation, and commissioning. The objective of this course is to provide a comprehensive overview of substation components along with a study guide for them. The course will cover detailed design information as well as other substation engineering technologies that are becoming increasingly important in modern power systems.

Course Code:	ECCE5342	Course Title:	Electrical Engineering Materials
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers composite insulators, electrical flexible and rigid laminates with and without epoxy resin coating, high- and low-temperature superconductors, nanodielectrics, nanodielectric composites, magnetic nanocomposites, nanofluids, graphene supercapacitors, nanostructured soft magnetic materials for high frequency inductors and transformers, high performance soft and permanent magnetic materials, functionally graded materials, industrial applications.

Course Code:	ECCE5352	Course Title:	Generalized Machines Theory
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Application of matrix algebra to static electric networks, matrix equations of transformers, matrix equations of basic rotating machines, commutator machines, linear transformation in electrical machines, polyphase machines.

Course Code:	ECCE5410	Course Title:	Intelligent Control Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an introductory course in intelligent control systems. The course includes two types of intelligent controllers, namely fuzzy logic controllers and neural -network controllers. The following topics will be covered, review of control models and issues, fuzzy logic for control and fuzzy control systems, neural networks for control, and Neural control systems. Adaptive network fuzzy inference systems (ANFIS). Engineering Applications.

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Course Code:	ECCE5411	Course Title:	Introduction to the Industrial Network Practices
No. of credit hours:	3	No. of contact hours:	4

A short description:

In this course, the students learn basic engineering skills to design and build data communication networks and the internet of things for Industrial Automation Control Systems (IACS). It introduces briefly the principles of IACS networks. This course covers topics, Physical Datalink and Network layers of the ISO/OSI reference model, basics of serial, Ethernet, TCP/IP, Fiber optics and wireless technologies. Design and build a proper IACS network infrastructure that conforms to current industry and international security standards. Hands-on exercises and case studies on IT and OT for the IACS networks. It will discuss the influence of 5G technology on the Industrial Internet of Things (IoT).

Course Code:	ECCE5412	Course Title:	Mechatronics
No. of credit hours:	3	No. of contact hours:	4

A short description:

Development of mechatronics engineering. Industrial applications of mechatronics systems.

Course Code:	ECCE5414	Course Title:	Real Time Control System
No. of credit hours:	3	No. of contact hours:	4

A short description:

The topics of this course include: An introduction to discrete time control systems, including discretization by z-transform or emulation. Techniques for embedded systems in control engineering. Real-time systems, scheduling, queuing, etc., Sensor interfacing in digital control systems, implementation of observers. Vision techniques and algorithms in real time systems- Application to robotics/autonomous navigation. Case studies and implementation using high level digital signal processors.

Course Code:	ECCE5415	Course Title:	Control of Electrical Machines
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the basics of Electrical machines dynamics and transformations. The course material includes dynamic modelling of DC machines, three-phase synchronous and asynchronous machines, dynamic modelling of special machines, such as BLDC and stepper motors. Introduction to control methodologies of induction and BLDC motors. Intelligent control Techniques for AC machines. Selection criteria of motors for different applications. The course includes simulation of different machines using MATLAB/SIMULINK software.

Course Code:	ECCE5422	Course Title:	Selected Topics in Control Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

A seminar-type course which covers topics of current interest in control systems design and analysis. the subject matter of this course will vary from year to year.

Course Code:	ECCE5432	Course Title:	Programmable Logic Control Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

Control system components modelling and design of sequential controls, review of sensors and actuators of interest, Programmable Logic Controllers (PLCs): principles, interfacing and programming, programmable controller's communication and networking, user interface, process monitoring and visualization, supervisory (SCADA).

Course Code:	ECCE5433	Course Title:	Modern Control Systems
No. of credit hours:	3	No. of contact hours:	4

A short description:

State space representation of dynamic systems. Linearization of nonlinear systems. Solutions of state space equations. Lyapunov stability analysis. Controllability and observability of linear systems. Pole placement technique design. Design of observers. Kalman filters. Introduction to the optimal design in control.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE5434	Course Title:	System Dynamics and Simulation
No. of credit hours:	3	No. of contact hours:	4

A short description:

Models of Physical systems (Electrical, Mechanical, Hydraulic, Pneumatic and Thermal). Principles and phases of physical modelling. Basic relationships in physics. Bond graphs. Non-parametric and parametric identification methods. Tools for model building. Simulation and model use.

Course Code:	ECCE5443	Course Title:	Optimization Techniques in Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

Linear programming. Simplex method. Duality theory. Network flow problems. Elements of integer programming. Nonlinear programming. A brief overview of interior point methods and global optimization techniques.

Course Code:	ECCE5445	Course Title:	Control Systems Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

State space representation of dynamic system . Linearization of nonlinear systems. Solutions f state space equations. Controllability and observability. Pole placement design technique. Design of observers. Introduction to the optimal design in control. Review of frequency domain analysis. Nyquist criteria for Stability and relative stability. Design of compensators is the frequency domain. case studies.

Course Code:	ECCE5452	Course Title:	Computer Aided Instrumentation
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to fundamentals of measurement and Instrumentation systems with hardware and software components, Principles and implementation of interfacing the computer and stand-alone instruments with real world signals, Fundamentals of data acquisition with focus on Computer-based operation of data acquisition systems, Enable design, Installation, Configuration, and Programming of data acquisition systems effectively, Design and implementation of Virtual Instruments. Introduction to Intelligent Instrumentation systems.

Course Code:	ECCE5453	Course Title:	Mobile Robot Control
No. of credit hours:	3	No. of contact hours:	4

A short description:

General Concept of mobile robots kinematics, Mobile robots dynamics, Mobile robots sensors, Mobile robots control, Mobile robot path, motion and task planning, Mobile robot localization and mapping, Experimental studies.

Course Code:	ECCE5462	Course Title:	Electric Drives
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course deals with dc and ac machines modelling including dq modelling of ac motors, characteristics of electric drives, speed and torque control of DC motor drives, voltage control and variable frequency control of AC motor drives and drives applications.

Course Code:	ECCE5464	Course Title:	Advanced Power Electronics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced course in power electronics. It covers power electronics systems and switches, controlled and uncontrolled rectifiers, DC-DC converters, DC-AC inverters, resonant converters, power conditioners, and UPS.

Course Code:	ECCE5501	Course Title:	Co-Operative Training-I
No. of credit hours:	0	No. of contact hours:	35

A short description:

Co-Operative Training courses are optional. These are designed for students who are following Scheme-I or Scheme-II and willing to take a one-year Co-Op program after finishing semester-8. Internal regulations apply.

Course Code:	ECCE5502	Course Title:	Co-Operative Training-II
No. of credit hours:	6	No. of contact hours:	35

A short description:

Co-Operative Training courses are optional. These are designed for students who are following Scheme-I or Scheme-II and willing to take a one-year Co-Op program after finishing semester-8. Internal regulations apply.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

- MSc in Electrical and Computer Engineering**

Qualification Title:

- MSc in Electrical and Computer Engineering (Specialization: Computer Systems & Network)
- MSc in Electrical and Computer Engineering (Specialization: Communications and Signal Processing)
- MSc in Electrical and Computer Engineering (Specialization: Power Systems and Energy Engineering)
- MSc in Electrical and Computer Engineering (Specialization: Electronic Instrumentation and Control)

Course Description

Course Code:	ECCE6122	Course Title:	Digital Signal Processing
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

The course covers digital signal processing fundamental and applications. Topics include: introduction to digital signals and systems, review of z-transform, Fourier transform and its applications, digital filters: recursive and non-recursive, design of digital filters. Adaptive digital filters: Wiener filters, linear prediction filters, least mean square error adaptive filters. Hardware implementation of DSP systems, Different applications of DSP.

Course Code:	ECCE6123	Course Title:	Quantum Communications
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course provides an introduction to the basic principles of quantum communication and networking. Topics covered include introduction to quantum communication; comparison between classical and quantum communication systems; quantum decision theory; constellations of quantum states under different modulation schemes; quantum information theory; capacities of quantum channels; quantum error correction; programming languages and simulation/measurement tools; quantum security and privacy; quantum key distribution; quantum algorithms; quantum technologies and multiplexing.

Course Code:	ECCE6124	Course Title:	Digital Transmission
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Digital transmission over AWGN channels. Digital transmission over band-Limited channels. Inter symbol Interference. Signal design for band-Limited channels. Channel equalization. Characterization of fading multipath channels. Performance of digital transmission over fading channels. Diversity techniques. Spread spectrum. Multi-user communication. Overview of Advanced Communications Systems (satellite, mobile, optical, etc.) and research studies in the area will be conducted.

Course Code:	ECCE6125	Course Title:	Infrared Radiation and Imaging: Theory and Applications
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course deals with selected topics in Infrared optical communication and concentrates on IR thermography, analysis, applications. Main subjects cover: Optical Wireless Communication, Fundamentals of IR, Thermal Imaging, Properties of IR Systems, Methods in IR Imaging, Errors and Uncertainties, Examples of Applications, IR research Topics in Industry. CAD tools used for analysis of data by students' projects to help initiate them to research and development.

Course Code:	ECCE6126	Course Title:	Satellite Technology
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course covers essential components governing current satellite technologies. The topics are subdivided into three main areas. Firstly, the space environment, that focuses on basic celestial mechanics and satellite dynamics, with the mission analysis. Secondly, the space segment, which includes the satellites and their components. Thirdly, the ground segment, that includes the station and components. Teaching will be enhanced through CAD tools and laboratory experiments.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE6127	Course Title:	Information Theory and Coding
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Measures of information, Entropy, Source Coding theory, Lossless data compression, Huffman Codes, Ziv-Lempel and Elias Codes, Arithmetic Codes, Run-length Encoding, Sources with memory, Lossy data compression, Rate distortion theory, Mutual Information, Memoryless channels.

Course Code:	ECCE6128	Course Title:	Antenna Theory and Design
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

The course covers modern antenna design and theory. Topics include: Transmission Line Theory and Field Concepts (review). Antenna Basics. Types of Antennas. Computer-aided Antenna Design and Analysis. Antenna Measurements.

Course Code:	ECCE6133	Course Title:	Optical Communications
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Introduction: fiber losses, compnents, modulation and demodulation of light signals. Fiber optic transmission. Different types of fiber cables, wavelengths. Different types of optical transmitters. Chromatic dispersion and polarization mode dispersion WDM networks, topologies control and connection's management, and TDM networks. Advance toipcs with particular attention to WDM and DWDM technologies. DWDM optical solutions and its effect on current networking practices. Deployment of optical network solutions across a LAN using Gigabit Ethernet, fiber LANs, elimination of bandwidth bottlenecks and improve flexibility of network services. Fundamental challenges for optical routing.

Course Code:	ECCE6134	Course Title:	Special Topics in Communications
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course covers the state of the art in one of the areas of interest to students in the field.

Course Code:	ECCE6135	Course Title:	RF Communications Circuits Design
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course aims to provide students with an advanced knowledge of RF communications circuits design. The course covers the issues of RF circuit analysis, design and measurements; micro strip transmission line designing and analysis; S-parameters; Couplers and filter design; mixers and oscillators; Low-noise and Power Amplifiers (PA) design, CMOS Power amplifiers design issues, RFs safety in designing, overview of state of the art fabrication techniques and applications, Computer aided design and simulation of RF circuits

Course Code:	ECCE6150	Course Title:	Microwave Remote Sensing
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course will cover the fundamentals of passive and active microwave remote sensing and provide a summary of the information needed to understand space-based microwave remote sensing systems. The course is aimed to enrich students background in satellite communication systems and instrument design as well as to understand remote sensing of the land, sea and atmosphere. Each topic will be illustrated using published data about current remote sensing instruments, focusing on practical working systems and issues. Passive remote sensing techniques will be emphasized.

Course Code:	ECCE6161	Course Title:	High Speed Digital Design
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

The objective of this course is to present different issues and special considerations in analyzing and designing high speed circuits for computing and communication applications. Analytical and modern simulation techniques will be used.

ACADEMIC DEPARTMENTS

ELECTRICAL AND COMPUTER ENGINEERING

Course Code:	ECCE6162	Course Title:	Switching Theory: Design and Applications
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Radio wave classifications, Propagation of VHF, UHF, SHF and ELF; Calculation of field strength; Noises and losses; Design of radio wave system; Analysis of radio wave propagation indoor environment; Radio wave propagation in urban and suburban areas; Radio spectrum management, policies and security. Research papers in the area will be reviewed as case studies.

Course Code:	ECCE6212	Course Title:	Principles of VLSI Design
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Very Large Scale integrated (VLSI) circuit design. Provides a review of FET basics with Functional module design including combinational memory, combinational logic, programmable logic arrays and finite-state machines. Computer-aided VLSI fabrication techniques, layout strategies, scalable design rules, design-rule-checking and guidelines for testing and testability are covered along with. Survey of VLSI applications.

Course Code:	ECCE6213	Course Title:	Direct Studies
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Directed Studies courses make it possible for one or more students to work under the guidance of a faculty member on a reading or research topic of mutual interest. Directed Studies courses are not to duplicate material covered in other department courses, and should contain a strong element of research. Ideally, the course should be based on some issues associated with a research topic.

Course Code:	ECCE6232	Course Title:	Advanced Computer Architecture
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Topics spanning the current state of the art in commodity microprocessor design as well as general components and system design. Subjects will include: instruction sets, pipelining, parallelizing architectures (superscalar, VLIW, EPIC), vector, parallel and multi-processing, instruction scheduling (branch prediction, speculative and out-of-order execution, etc), fast arithmetic units, cache storage hierarchy design. I/O sub-systems. Additional lectures will target topics of particular research interest such as modern high performance architectures (e.g. multi-core CPUs) as a case study

Course Code:	ECCE6242	Course Title:	Advanced Computer Networks
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

The goal of this course is to take a broader view of networking issues and solutions. The main objective is to strengthen the student's understanding of fundamental concepts, particularly related to scheduling, congestion control, routing, traffic management, wireless access and mobility, and applications in ATM and Wireless networks. More importantly, the course discusses how networking may evolve in the future to provide ubiquitous support for quality-of-service (QoS) in heterogeneous environments. Issues about computer security, VLANs, and VPNs might be covered too. The course might use some network simulation software packages.

Course Code:	ECCE6243	Course Title:	Wireless Communication
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Introduction on design, planning, implementation and operation of wireless networks. It covers a comprehensive overview of technologies, security concerns and design best practices with particular emphasis on the following areas: Wireless LAN; design Parameters; 802.11a & 802.11b etc. technologies, products and solutions; WLAN Security - 802.1x, EAP, LEAP, WEP, SSI; Wireless Routing Techniques; Mobile Ad Hoc Networks; Wireless Cellular/Mobile Networks: GPRS and UMTS features and underlying technologies.

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Course Code:	ECCE6250	Course Title:	Digital Image Processing
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Fundamental processing methods for black/white and color images. Image representation. Modern display techniques including animation. Image transformations leading to Image restoration, image enhancement, image classification, image analysis, image reconstruction, data merging and GIS integration and image transmission and compression. Human Vision System (HVS) for optimal image data compression and optimal image display. Applications in land cover mapping, environment monitoring and oceanography.

Course Code:	ECCE6261	Course Title:	Advanced Modelling and Simulation
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

Theoretical background on modelling and simulation applied to electrical and mechanical systems with applied techniques to some modelling and simulation environments. In addition, this course will provide hands-on experience with model building, simulation, testing, and analyzing. Research papers in the area will be reviewed as case studies.

Course Code:	ECCE6262	Course Title:	Real Time Systems
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course addresses the fundamental software and hardware problems, concepts, and approaches in the design and analysis of real-time systems. It presents examples of real-time systems and gives an in-depth treatment of timing analysis and scheduling. The course is organized around the issue of real-time requirements and their impact on the architecture of a system. It also introduces dynamic voltage scaling frequency processors and shows approaches to design power aware computing systems.

Course Code:	ECCE6275	Course Title:	Neural Networks and Intelligent Systems
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

The goal of the course is to design and analyze intelligent systems using neural network technique; Modelling, simulation, and analysis of artificial neural networks; Relationship to biological neural networks; Design and optimization of discrete and continuous neural networks; Back propagation, and other gradient descent methods; Hopfield and Boltzmann networks; Unsupervised learning; Self-organizing feature maps; Applications chosen from function approximation, signal processing, control, computer graphics, pattern recognition, time-series analysis; Relationship to fuzzy logic, genetic algorithms, and artificial life. Research papers in the area will be reviewed as case studies.

Course Code:	ECCE6276	Course Title:	Industrial Automation and Robotics
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

The goal of this course is to provide the students with a general view of the current methods and tools offered by automation technologies for smart factories, including industrial and collaborative robotics. The emphasis will be put on defining a formalism tool that serves as a beginning step toward the better understanding and modelling of increasingly complex engineering systems and eventually toward the better design of automated systems, this formalism is based on the concept of the Petri-Net, colored Petri-Net. The course will also discuss technological aspects for the implementation of the automation systems, with specific reference to digital control, programming of logic controllers, communication protocols, and programming industrial robots.

Course Code:	ECCE6282	Course Title:	Advanced Network Security
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course addresses various advanced topics of network security. The first part of the course reviews a number of topics on network security including cryptography, security threats and services. The second part of the course explores security/privacy issues in existing as well as emerging areas such as wireless networking, the cloud, Internet of Things (IoT), smart grids etc.

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Course Code:	ECCE6284	Course Title:	Reliability & Fault-Tolerant Systems
No. of credit hours:	(3 Credits)	No. of contact hours:	

A short description:

This course covers issues of reliability in the design of computing systems and the Concept of fault-tolerant computing systems. Examples and methodology of some fault-tolerant computing systems (JPL-STAR, FTMP, SIFT) are studied. Requirements and approaches in the design of fault-tolerant systems. Fault-tolerant architectures for space-mission computers, real time critical systems, fault-tolerant software and operating systems, and techniques for the performance estimation of fault-tolerant systems are also dealt with.

Course Code:	ECCE6292	Course Title:	Special Topics in Computer Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course covers the current state of the art in some of the hot areas of interest to students in the field of computer engineering.

Course Code:	ECCE6315	Course Title:	Power System Analysis
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course covers steady state analysis by digital computers of large integrated electrical power systems. Bus admittance and Impedance matrices, Advanced load flow studies, economic dispatch and optimal power flow, steady state security analysis, fault studies, automatic generation control, and state estimation. Research papers in the area will be reviewed as case studies.

Course Code:	ECCE6317	Course Title:	Economic Operations of Power Systems
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course deals with the economic operations of power systems. The course covers characteristics of power generation units, economic dispatch problem and solution methods, unit commitment problem and solution methods, AC/ DC optimal power flow problem. In addition, deregulated electricity market types and issues are introduced.

Course Code:	ECCE6316	Course Title:	Power System Stability and Control
No. of credit hours:	3	No. of contact hours:	3

A short description:

Review of stability theory, classical transient analysis, dynamical models of synchronous machines, power system stability under small and large perturbations, dynamic simulation of power systems, power system stabilizer. Research papers in the area will be reviewed as case studies.

Course Code:	ECCE6318	Course Title:	Power System Operation & Control
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course deals with the operation and control of electrical power systems. The course covers control of power generation units, load frequency control, unit commitment problem and solution methods, optimal power flow problem, power system security, voltage and reactive power control, and state estimation.

Course Code:	ECCE6319	Course Title:	Microgrids and Smart Grid
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course deals with two important emerging concepts in modern power systems: microgrids and smart grid. Microgrids as small-scale localized power grid with its own power generators, loads and definable boundaries will be studied. Various types of microgrids that involve multiple energy sources including renewable energy will be discussed. Stand-alone (off-grid) and connected-to-grid (on-grid) configurations of microgrids will be described. In the second part of the course, a smart grid consisting of additional communication systems, controls, computers, automation, and other new technologies and equipment in an electrical power grid will be studied. These components work together to respond to the continuous changes expected in the power grids of the future.

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Course Code:	ECCE6320	Course Title:	Advanced Power System Protection
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course provides students with advanced techniques of protection analysis and design for electric power systems. In this course the students can: Study transient characteristics of voltage transformers and current transformers, Understand the concept of protection system discrimination and appreciate its importance in improving security of energy supply, analyze mathematical algorithms applied to numerical relaying. Study high speed relaying and fault location. Study adaptive protection systems related to electric power systems. The course includes new trends in the design of protection relays and coordination. It also emphasizes modern techniques of protecting electrical networks connected to renewable energy resources during grid-connected and islanding modes.

Course Code:	ECCE6325	Course Title:	Integrated Resource Planning for Electric Utilities
No. of credit hours:	3	No. of contact hours:	3

A short description:

Local forecasting. Time value of money. Economic evaluation of investment proposals. Generating system cost. Post plant reliability. Generating system reliability. Value of reliability. Energy production simulation. Generation planning. Demand-side management. Societal costs. Integrated demand-supply planning. Transmissions planning. Electricity tariffs.

Course Code:	ECCE6335	Course Title:	Special Topics in Power Systems
No. of credit hours:	3	No. of contact hours:	3

A short description:

Advanced special topics in the field of electrical power system engineering.

Course Code:	ECCE6345	Course Title:	Electrical Power Engineering Materials
No. of credit hours:	3	No. of contact hours:	3

A short description :

This course covers classical theory of conduction, band theory & free electron theory, classical & quantum mechanical explanations of magnetic properties, simplified quantum mechanical explanation of superconductivity, polymeric cable insulation: electrical conduction in solids, review of polymeric materials, the structural elements within polymeric materials, charge transport, hopping transport, traps and space-charge, design and manufacturing of polymeric-insulated cables and composite insulators. Research papers in the area will be reviewed as case studies.

Course Code:	ECCE6346	Course Title:	High Voltage Technology
No. of credit hours:	3	No. of contact hours:	3

A short description :

This is an advanced course in High Voltage Technology, which covers the importance of using high voltages in power systems, the different phenomena associated with the applications of the high voltage, insulation coordination, high voltage generation and measurement, and dielectric breakdown of different states of matter, the state-of-the-art of technologies used in power cables, circuit breakers, hybrid and normal gas-insulated lines, gas-insulated switchgear, powerformers, surge arresters, and composite insulators.

Course Code:	ECCE6355	Course Title:	Distributed Generation
No. of credit hours:	3	No. of contact hours:	3

A short description :

This course discuss the technical issues related to integration of Distributed Generation (DG) in distribution networks, its impact on power flow, short circuit currents, reliability, power quality and transient stability, and the positive effects of DG on the environment, energy efficiency, security of supply and electricity tariff

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Course Code:	ECCE6366	Course Title:	Generalized Electrical Machine Theory
No. of credit hours:	3	No. of contact hours:	3

A short description :

Basic principles of Electric Machine Analysis: Magnetically coupled circuits, Electromechanical Energy conversion, machine windings and air gap mmf, winding inductances and voltage equations.

Course Code:	ECCE637	Course Title:	New Trends in Electrical Machines Technology
No. of credit hours:	3	No. of contact hours:	3

A short description :

Characteristics, performance, modelling (using MATLAB/SIMULINK), and applications for stand-alone and doubly-fed induction generators, unbalanced operation of induction motors, two-phase motors, multiphase machines (generators and motors), Direct drive PM generators, advanced topics in switched reluctance motors.

Course Code:	ECCE6400	Course Title:	Optimization Techniques in Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description :

This course covers optimization techniques and their engineering applications. Topics include introduction to optimization techniques, unconstrained and constrained optimization. Penalty functions, duality, and geometric programming. Direct search methods for nonlinear optimization. Dynamic programming. Biological inspired optimization algorithms.

Course Code:	ECCE6423	Course Title:	Optimal Control Systems
No. of credit hours:	3	No. of contact hours:	3

A short description :

Theoretical and algorithmic foundations of deterministic optimal control theory, including calculus of variations, maximum principle, and principle of optimality; Linear-Quadratic-Gaussian design; Differential games and H-infinity optimal control design. Research papers in the area will be reviewed as case studies.

Course Code:	ECCE6424	Course Title:	Computer Control of Dynamic Systems
No. of credit hours:	3	No. of contact hours:	3

A short description :

Review of digital control. Summary of the z-transform, stability. Controller design by transfer function :PID, pole placement(Diophantine eq.), Internal model control. State variable analysis and design: pole placement using state feedback , state estimation, optimal control

Course Code:	ECCE6425	Course Title:	Nonlinear Systems and Engineering Applications
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course presents qualitative analysis of nonlinear dynamical systems. The course includes fundamental properties of nonlinear systems, Lyapunov stability, input-output stability, passivity, feedback linearization, nonlinear design tools.

Course Code:	ECCE6426	Course Title:	Modelling and Control of Renewable Energy Systems
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course presents modelling techniques and control strategies of different components in renewable energy systems. The course includes photo voltaic, wind power and hydro power as renewable sources of energy. State-space and transfer function modelling of these sources will be covered. Classical and intelligent control techniques will be presented.

Course Code:	ECCE6430	Course Title:	Advanced Power Electronics
No. of credit hours:	3	No. of contact hours:	3

A short description:

This is an advanced course in power electronics. It includes Protection of semiconductor devices and circuits; Firing circuits of transistors and thyristors; Static switches; Pulse-width-modulated inverters; Resonant pulse converters; Power supplies.

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Course Code:	ECCE6431	Course Title:	Control of Electric Drives
No. of credit hours:	3	No. of contact hours:	3

A short description:

This advanced course presents: Modelling of DC machines, induction machine, synchronous machine. Closed loop control of solid-state DC drives, scalar and vector control of induction machine, direct torque and flux control of induction machine, sensorless control and flux observers. Self-controlled synchronous motor, Vector control of synchronous motor, cycloconverter-fed synchronous motor drive, permanent magnet synchronous motor drive, brushless DC motor drive, Switched reluctance motor drive, stepper motors, Brushless DC motor drive, Permanent magnet drives, Industrial drives.

Course Code:	ECCE6440	Course Title:	Intelligent Sensor Systems
No. of credit hours:	3	No. of contact hours:	3

A short description:

Introduce the fundamentals of intelligent sensor systems: sensors, instrumentation, and pattern analysis. Provide the students with an integrative and multidisciplinary experience by building a complete multi-sensor intelligent system. Allow students to develop instrumentation, data acquisition and pattern analysis software using modern equipment and software tools. Research papers in the area will be reviewed as case studies.

Course Code:	ECCE650	Course Title:	Advanced Robot Manipulation
No. of credit hours:	3	No. of contact hours:	3

A short description:

Continuation of the analysis of robot manipulation, considering kinematic redundancy, control of robot manipulators in contact with the environment, tele-operation, and grasping with multi-fingered hands. Students will conduct case studies and review research papers in the area.

Course Code:	ECCE6492	Course Title:	Selected Topics in Control
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course is devoted to the study of advanced topics in the formulation and solution of theoretical or practical problems in control Engineering. The subject matter of this course will vary from year to year.

Course Code:	ECCE6510	Course Title:	Advanced Spectral Analysis for Biomedical Signals
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course covers the topic of spectral analysis from the basic Fourier transform to the more advanced methods of time-frequency distributions, wavelet transforms, empirical mode decomposition. It gives the student powerful tools to analyze biomedical signals and extract important information from them. This information can then be used to diagnosis large number of human diseases early enough to stop them from reaching critical stages.

Course Code:	ECCE7001	Course Title:	Distributed Generation
No. of credit hours:	6	No. of contact hours:	3

A short description:

This is a mandatory, research-based course. Students enrolled in this course are expected to individually engage in a comprehensive project to demonstrate their scholarly abilities. The Thesis topic is subject to the interest of the student and supervisor. Students are required to submit a synopsis of their work in the beginning, perform two seminars demonstrating the Thesis progress, pass the Thesis defence, and submit a Thesis report.

• PhD in Electrical and Computer Engineering

Course Description

Course Code:	ECCE8001	Course Title:	Ph.D. Thesis
No. of credit hours:	0	No. of contact hours:	

A short description:

The Thesis will comprise original research in Electrical and Computer Engineering field under the supervision of a senior faculty member and a thesis committee.

4.2.4 Labs and Workshops

The ECE Department has equipped laboratories to support both undergraduate and graduate courses in the areas of Electronic Circuits, Digital Systems, Communication Systems, Networking, Control Systems, Electrical Machines, High-Voltage Engineering, and Power Systems. Moreover, some of these laboratories are used for research, organizing workshops, and for carrying out final year projects. All laboratories are open from 08:00 am to 04:00 pm and are all provided with the lab safety equipment.

The Department has the laboratories as listed below:

1. Advanced Networks Lab
2. Communication lab
3. Advanced Communications Lab
4. Control Lab
5. Digital Logic Design Lab
6. Electric Machines and Power Electronics Lab
7. Control and Instrumentation Lab
8. Electronics Lab
9. High Voltage Lab
10. Impulse Voltage Lab
11. Smart Grid and Protection Lab
12. Power Stations and Transmission Lab
13. Final Year Projects Lab (Males)
14. Final Year Projects Lab (Females)



4.3 Department of Mechanical and Industrial Engineering (MIE)

4.3.1 Department Overview

The Department of Mechanical and Industrial Engineering (MIE) strives to achieve excellence in education, research, and service to industry. Its vision is to be a leading department in the region, recognized for the quality of its graduates, innovation, and societal impact. The Department offers undergraduate and postgraduate degrees (MSc and PhD) in both Mechanical and Industrial Engineering, as well as a joint undergraduate program in Mechatronics Engineering in collaboration with the Department of Electrical and Computer Engineering.

All three undergraduate programs—Mechanical, Industrial, and Mechatronics Engineering—are accredited by the Accreditation Board for Engineering and Technology (ABET), with the Mechanical Engineering program accredited in 2006 and the other two in 2009. The postgraduate programs aim to prepare graduates for leadership in academia, industry, and government, equipping them with the knowledge and skills to tackle real-world challenges through both coursework and research.

Faculty in the Department are engaged in a wide range of research areas, including applied mechanics, thermo-fluid sciences, materials and manufacturing, automation, ergonomics, and safety. The Department has witnessed growth in research output and collaboration, with several agreements signed with local industries to support product development, research, and training.

The Department remains committed to continuously improving its programs and contributing to national development. Its mission is to graduate engineers capable of applying scientific and engineering principles in multidisciplinary environments, upholding ethical practices, and addressing the needs of both local and global communities.

Vision of the Department

The vision is to be a leading Mechanical and Industrial Engineering (MIE) Department for the quality of its graduates, research and innovation, in the region and beyond.

Mission of the Department

The mission of the MIE Department is to provide an intellectual environment for learning, research and innovation, and to serve the community better. This is accomplished by:

1. Providing a comprehensive engineering education with life-long learning skills that encompass innovation, entrepreneurship, ethics and values.
2. Serving local, regional and global industries via effective academia-industry linkage.
3. Promoting collaborations with local and international communities in order to enhance public awareness, advancement of engineering knowledge, and department visibility.



4.3.2 Faculty and Staff



Dr. Nasr Al-Hinai

Associate Professor, Head of the Department

Research Interests: Production Planning and Control, Metaheuristics in Operations Research, Product Design and Development, Project Management, Analysis of Bio-Composites Development Processes



Dr. Abdullah Al-Shabibi

Associate Professor, Assistant HoD

Research Interests: Thermo-Elastic Instability of Contact Problems, Finite Element Modelling and Analysis, Composite Materials Applications in Gas and Oil Industry, Pressure Vessels Integrity and Failure



Dr. Nabeel Al-Rawahi

Associate Professor, Dean of the College of Engineering

Research Interests: Renewable Energy systems, Thermodynamics System, Multi-Phase Flow, Fluid Mechanics, Computational Fluids



Dr. Majid Al-Maharbi

Associate Professor, Assistant Dean of the PSR

Research Interests: Metallurgy, Mechanical behaviour and microstructure of metallic materials, Failure Analysis of materials, Plastic Deformation, texture and anisotropy, Solid-state recycling of light metallic materials, Metallic based composites



Prof. Tasneem Pervez

Professor

Research Interests: Laminated Composites and Functionally Graded Materials, Solid Expandable Tubular with or without Elastomers, Application of FEM in Engineering Design and Analysis, Material Homogenization



Prof. Sayyad Zahid Qamar

Professor

Research Interests: Applied materials and manufacturing; Applied mechanics and design; Reliability engineering, Analytical, numerical, and stochastic modelling; Development of experimental facilities



Prof. Khalid Alzebdeh

Professor

Research Interests: Technology Innovation, Manufacturing Processes, Advanced Materials, Bio Composites, Nanomaterials, Project Management, Analysis of Bio-Composites Development Processes



Dr. Amur Al-Yahmedi

Associate Professor

Research Interests: Legged Robotics, Mobile robot navigation, Autonomous car navigation, Multibody Dynamics and Modeling & Simulation



Dr. Mahmood Al-Kindi

Associate Professor

Research Interests: Lean Six Sigma, Operations Research, Product Design and Development, Risk and Decision Analysis



Dr. Nasser Al-Azri

Associate Professor

Research Interests: Renewable energy, Process optimization, Decarbonization, Engineering education

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MECHANICAL AND INDUSTRIAL ENGINEERING



Dr. Riadh Zaier

Associate Professor

Research Interests: Robotics and Automation, Mechatronics System Design, Bioinspired Control Methods, Legged Robotics



Dr. Hakan Gültekin

Associate Professor

Research Interests: Modern Manufacturing Systems, Production Planning and Scheduling, Energy Systems Optimization, Logistics and Transportation Systems, Supply Chain Management, Heuristic/Metaheuristic Optimization



Dr. Afzal Husain

Associate Professor

Research Interests: Renewable and Green Energy (Hydrogen, Solar Thermal, Photovoltaic, Photovoltaic Thermal, and Wind), Computational Fluid Dynamics (CFD), Electronics Cooling and Heat Transfer Enhancement, Microfluidics and Multiphase Flows



Dr. Khurshid Alam

Associate Professor

Research Interests: Applied Mechanics, Biomechanics, Material Characterization, FE Modeling and Analysis



Dr. Abdullah Al-Janabi

Associate Professor

Research Interests: Renewable Energy Technologies, Thermal Management of Engineering Systems, Heat Exchangers Fouling Mitigation Techniques



Dr. Niyazi Onur Bakır

Associate Professor

Research Interests: Reliability Engineering, Decision and Risk Analysis, Homeland Security



Dr. Ahmed Shaban

Associate Professor

Research Interests: Industrial Engineering, Operations Research, Quality Control, Supply Chains, Energy Systems, Simulation Modeling, Modeling and Optimization



Dr. Kassim S. Al-Rubaie

Associate Professor

Research Interests: Additive Manufacturing and Manufacturing Technology, Wear and Corrosion of Materials, Fatigue and Fracture Mechanics, Process-Structure-Property Relationships of Materials



Dr. Ahmed Elwardany

Associate Professor

Research Interests: Hydrogen-Carrier Fuels Combustion, Hydrogen Production by Gasification, Engine and Flame Simulations, Nano-materials Production by Combustion



Dr. Farooq Al-Jahwari

Assistant Professor

Research Interests: Finite Element Analysis and Design; Processing, Analysis and Characterization of Polymers and Composites; Molecular Dynamics; Impact Mechanics; Smart Materials; Cellular Structures; Design and Fabrication of High Damping Materials for Impact Attenuation

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MECHANICAL AND INDUSTRIAL ENGINEERING



Dr. Emad Summad

Assistant Professor

Research Interests: Social Networks & Diffusion, Complexity Methods, AI-Augmented Innovation, System Reliability



Dr. Musaab Zarog

Assistant Professor

Research Interests: Microelectromechanical Systems (MEMS), Vibration-based Energy Harvesting, AI Predictive maintenance, Engineering Research Impact, Decision Making Application for Islamic Sciences



Dr. Omar Al-Abri

Assistant Professor

Research Interests: Applied Mechanics, Mechanics of Materials, Finite Element Analysis, Crystals Plasticity, CPFEM



Dr. Sulaiman Al-Obaidani

Assistant Professor

Research Interests: Membrane Technology, Membrane Distillation, Water treatment, Desalination, Fluid Mechanics



Dr. Nasra Al-Maskari

Assistant Professor

Research Interests: Mechanical Engineering Design, Product Design, Bioinspired Design and Biomimetic, Design of Drones and UAVs, Design of Turbodrill for Oil and Gas Industry



Dr. Hussein Obeid

Assistant Professor

Research Interests: Robust & adaptive control and observer design, Machine learning & deep reinforcement learning, Energy storage systems (Li-ion batteries, fuel cells), Energy management optimization (EVs, microgrids), HIL & PHIL test benches, Control & observation of electromechanical systems



Dr. Moosa Al-Kharusi

Assistant Professor

Research Interests: Computational Mechanics of Advanced Materials, CNT-based Nanocomposites, Additive Manufacturing in Biomechanics, Biomedical Composite Materials, Finite Element Modeling, Swelling Elastomers in Oil Applications mechanics, Mechanical characterization of graphene materials.



Dr. Mohamed Al-Lawati

Assistant Professor

Research Interests: Nonlinear control, UAVs, Robotics, Multi-agent systems



Engr. Said Al-Qarni

Department Superintendent



Engr. Mohammed Al-Hadhrami

College Technician Superintendent

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING



Engr. Mohammed Ali Al-Hadhrami
Engineer



Engr. Abdullah Al-Omrani
Engineer



Engr. Nour Al-Rasbi
Engineer B



Engr. Nusiba Al-Kharusi
Engineer B



Engr. Hawraa Alajmi
Engineer B



Engr. Mahmood Al-Riyami
Engineer B



Engr. Mohammed Al-Salmi
Support Engineer



Mr. Yahia Al-Agbari
Technician



Mr. Mahfoudh Al-Sharji
Technician



Mr. Hamoud Al-Mahrizi
Senior Technician A

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Mr. Saleh Al-Malki

Technician



Mr. Sultan Salim Ali Al-Hammadi

Technician



Mr. Fawzi Al-Maashri

Technician



Mr. Faisal Al-Darmaki

Technician C



Mr. Issa Al Saifi

Store Keeper



Ms. Khazina Al-Kalbani

Coordinator, Follow up & Archive specialist

4.3.3 Academic Programmes

- BSc. in Mechanical Engineering**

Course Description

Course Code	HIST1010	Course Title	Oman and Islamic Civilization
No. of Credit Hours	2	No. of Contact Hours	2

A short description:

This course is a comprehensive survey of the role of Oman in Islamic civilization including an historical and geographical introduction to Oman before Islam; the efforts of the Omanis in spreading Islam; study of aspects of Islamic civilization, and Oman's role.

Course Code	ISLM1010	Course Title	Islamic Culture
No. of Credit Hours	2	No. of Contact Hours	2

A short description:

This course aims at teaching students the main constituents of Islamic Culture. The course studies the concept of Islamic culture, its sources, characteristics and constituents. Moreover, it focuses on God, the Universe, human being, life etc.

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Course Code	ENGR1501	Course Title	Introduction to Engineering
No. of Credit Hours	1	No. of Contact Hours	4

A short description:

This course is a summary of all the engineering disciplines in which undergraduate engineering degrees are offered at the Sultan Qaboos University (College of Engineering). Students will be familiarized not only with the fundamentals of each discipline, but will also be enlightened by the experiences of engineering professionals in the industry. This would enable students to get a glimpse of each engineering discipline and will also give an idea of what to expect as an engineer once they graduate. There will be lectures and seminars on topics listed in this course outline.

Course Code	ENGR1600	Course Title	Workshop I
No. of Credit Hours	1	No. of Contact Hours	2

A short description:

As well as giving an extensive grounding in theoretical aspects of engineering, the professional engineer needs to appreciate the methods by which things are made and to understand and respect the skills involved in these processes. An elementary knowledge of manufacturing techniques is an essential for many undergraduate courses, so that some workshop experience is now regarded as necessary before starting an engineering course or in the initial year of that course. This course gives a "hands on" element in the workshop environment.

Course Code	CHEM1071	Course Title	General Chemistry for Engineering
No. of Credit Hours	3	No. of Contact Hours	3

A short description:

This is an introductory survey course designed to give engineers an appropriate background in chemistry. It includes topics such as atomic structure, bonding, states of matter, energy changes, reaction kinetics and equilibrations in solution, and the periodic table.

Course Code	LANC2160	Course Title	English for Engineering I
No. of Credit Hours	3	No. of Contact Hours	3

A short description:

The aim of upper intermediate course is to develop the study and language-related skills required by engineering students in order to deal with their academic studies. The course teaches the academic reading and writing skills associated with the most common language functions found in general scientific English, such as generalizing, describing, defining, classifying and hypothesizing.

Course Code	MATH2107	Course Title	Calculus I
No. of Credit Hours	4	No. of Contact Hours	4

A short description:

This is the first standard calculus course of three. It presents practical and theoretical aspects related to: Limits and continuity, derivatives, functions (logarithmic, exponential, trigonometric, hyperbolic) and integration. The course also introduces Computer Algebra Systems CAS and their uses to the students.

Course Code	ARAB1060	Course Title	Arabic
No. of Credit Hours	2	No. of Contact Hours	3

A short description:

This course is based on the study and analysis of a number of different poetic and prose texts in the various religious, national, scientific, legal, economic, linguistic, etc. fields identified in the approved university textbook. The course involves the study of the fundamentals of Arabic language in a manner that helps to understand and absorb texts, describe their aesthetic and critical properties, analyze linguistic structures- in form and composition, significance and style- to identify the most prominent linguistic and rhetorical styles along with knowledge of some morphological, grammatical and rhetorical aspects and written techniques (spelling and punctuation). The course aims to train students to deal with the texts and exercises contained in the approved textbook.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	SOCY1005	Course Title	Contemporary Omani State and People
No. of Credit Hours	2	No. of Contact Hours	2

A short description:

The aim of the proposed course is to enhance students' awareness of identity, values of the Omani society, and to help students understand the role played by heritage, historical, demographic, cultural, and institutional variables in shaping and characterizing the Omani identity. The course also aims to shed light on the State's administrative system and the foundations of the Omani Renaissance and its indicators based on the thought of His Majesty Sultan Qaboos bin Said and his distinctive approach in building the nation and people.

Course Code	LANC2161	Course Title	English for Engineering II
No. of Credit Hours	3	No. of Contact Hours	3

A short description:

The aim of this advanced course is to further develop the study and language-related skills required by engineering students in order to deal with their academic studies. The course develops academic reading and writing skills at an intellectually challenging level. Classwork, group projects, and self-access assignments are included.

Course Code	MATH2109	Course Title	Calculus II for Science and Eng.
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This is the second course in a series of three Calculus courses. The course builds on the topics taught in Calculus I, and deals primarily with applications of integration such as calculating volumes, length of curves and surface areas, the techniques of integration of various functions, and proper and improper integrals. It also deals with sequences, series and their convergence, power series and their convergence as well as differentiating and integrating power series. The course ends with the introduction of polar coordinate system, polar curves and some basic polar calculus.

Course Code	PHYS2107	Course Title	Physics for Engineering I
No. of Credit Hours	4	No. of Contact Hours	6

A short description:

An introductory course that develops a sound understanding of the basic physical principles underlying natural phenomena related to translational dynamics, rotational dynamics, statics and fluids using elementary calculus and experimental techniques. The emphasis is on developing an intuition for the behaviour of physical systems and problem solving.

Course Code	MEIE3281	Course Title	Probability and Statistics for Engineers
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course emphasizes on the role of probability and statistics in engineering. The course will cover data summary and presentations; Introduction to probability; Discrete and continuous probability distributions; Hypothesis testing; Curve fitting, regression and correlation; Introduction to statistical quality control. Also, the use of computer applications in statistical analysis is emphasized. The examples and exercises strongly focus on engineering applications.

Course Code	PHYS2108	Course Title	Physics for Engineering II
No. of Credit Hours	4	No. of Contact Hours	6

A short description:

An introductory course that develops a sound understanding of the basic physical principles underlying natural phenomena related to electricity and magnetism and heat and thermodynamics using calculus and experimental techniques. The emphasis is on developing an intuition for the behaviour of physical systems and problem solving.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE3100	Course Title	Engineering Mechanics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

The objective of the course is to introduce students to the mechanics of rigid bodies. The course consists of two parts; statics and dynamics. Topics include: Review of forces, moments and free body diagrams; equilibrium of rigid bodies; analysis of truss/frames/machines; centroid of area; moment of inertia; friction; planar kinematics/kinetics of rigid bodies; forces and acceleration. Use of MATLAB as a tool to solve static and dynamic problems.

Course Code	MEIE3103	Course Title	Engineering Tools and Graphics
No. of Credit Hours	2	No. of Contact Hours	3

A short description:

This course introduces the fundamentals of computer/machine tools. The course will enable students to have practical skills in engineering drawing, basic programming and workshop practice. The course covers CAD and drafting, programming and basic machining operations. Topics include: Introduction to MATLAB/ LabVIEW; CAD drawing (2D & introduction to 3D modelling/assembly); Measurement tools; Machining, Drilling, Welding etc.; 3D printing and ideas for sheet metal working. Students will perform various hand and machine tool operations under staff supervision, and build and test a project.

Course Code	MEIE3102	Course Title	Solid Mechanics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Principles of basic mechanics are extended to cover range of simple stress calculations that all mechanical engineers should understand. These situations include concepts of normal and shear stress, concepts of normal and shear strain, relationship between stress and strain, normal stress and deformation in axially loaded members, shear stress and angle of twist in torque loaded members, stresses and deflection in beams, stresses in pressure vessels, statically indeterminate problems, and buckling of columns.

Course Code	MEIE3109	Course Title	Product Design
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This is a project-based course that covers the product design process. Topics include: introduction; product design strategies; identification of customer needs; translation of customer needs into product design specifications; concept generation, selection and testing; product architecture with focus on developing interfaces; prototyping and design for manufacturing. An idea of patents and intellectual property, and economics of product design will be discussed.

Course Code	MEIE3141	Course Title	Thermodynamics I
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This fundamental course introduces basic concepts and laws of thermodynamics through a balanced handling of theory and engineering applications. Main topics include: Forms of energy. Systems and control volumes. Properties, states, processes and cycles. Heat and work. The zeroth law of thermodynamics. Phase diagrams and property tables. Equations of state. The first law of thermodynamics. Heat engines and heat pumps. The second law of thermodynamics. The Carnot cycles. The Clausius inequality. Entropy.

Course Code	MEIE3162	Course Title	Materials Science and Engineering
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course is designed to give an introduction to the science and engineering of materials. It covers the structure and properties of materials used in engineering such as metals, polymers, and ceramics. The main topics are: crystal structure; imperfections in crystalline solids; mechanical properties; the effect of deformation on mechanical properties; phase diagrams and engineering alloys; material failure modes; experimental work (tensile, hardness, impact, annealing, crystallography).

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE3181	Course Title	Electromechanical Systems
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course introduces the fundamentals of electrical circuit analysis, electric machines and simulation of electromechanical systems. DC and AC circuits are discussed in this course, and students will be exposed to hands-on experience with electrical circuits. Moreover, simulation of electromechanical systems through finding their transfer functions is practiced. The course also covers the capabilities and limitations of different types of DC and AC electric machines in various drive applications.

Course Code	MATH3171	Course Title	Linear Algebra and Multivariate Calculus for Engineers
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Many physical quantities have a vectorial representation, and vector analysis often simplifies calculations considerably. The current course introduces the student to vector algebra, matrices and determinants, vector differential calculus, line and surface integrals, and divergence theorems.

Course Code	MEIE3122	Course Title	Machine Dynamics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course includes dynamic analysis and design of machines, kinematic analysis of mechanisms, cams, gears, force analysis, flywheels, balancing of machines- rotating and reciprocating unbalance, mechanical vibration, and case studies.

Course Code	MEIE3142	Course Title	Thermodynamics II
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course is the continuation of Thermodynamics I course (MEIE3141). The course will review the first and the second laws of thermodynamics, entropy and entropy generations for different thermodynamics systems. The course will discuss and analyze exergy, different power cycles, refrigeration and heat pump systems, air-conditioning processes, reacting mixture and combustion. Various examples will be discussed and analyzed throughout the course. Different power cycles efficiency will be discussed and analyzed. Different cycle components will be introduced and discussed, so students can relate their knowledge to engineering applications.

Course Code	MEIE4183	Course Title	Numerical Methods for Engineers
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course covers the basics of numerical methods for the solution of applied problems in engineering. Course emphasizes an understanding of the mathematics underlying the various numerical methods that have developed for solving linear and nonlinear problems and for approximating functions using polynomial approximations, splines and curve fitting. The course includes a treatment of numerical differentiation, numerical integration and an introduction to the computational solution of ordinary differential equations.

Course Code	MEIE4126	Course Title	Instrumentation and Measurement
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course covers the measurement systems; static and dynamic characteristics of signals; measurement system behaviour; uncertainty analysis; Analog electrical devices and measurements; Sampling and data acquisition. Measurement of motion, force, torque, pressure, flow, temperature, heat-flux and humidity; Signal conditioning and transmission; Computer aided data acquisition and analysis; Design and Analysis of Experiments; Case studies. The course delivery is blended with the hands-on experiments using a variety of transducers and instruments with their analogue and digital interfacing.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MATH4174	Course Title	Differential Equations for Engineers
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Differential Equations of the first order, linear differential equations, Laplace transformation, Fourier series, Fourier transforms and partial differential equations.

Course Code	MEIE4104	Course Title	Design of Machine Elements
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course deals with the design of basic machine elements. The course is intended to teach the theory of machine design and how to design and analyze machine elements. It gives the student tools for stresses, strains, and strengths analyses of machine elements subjected to axial, torsional, bending, and combined loading. Topics include: failure theories under static and cyclic loading conditions; the design of springs, shafts, gears, and bearings. Applicability in a wide range of engineering applications is also discussed. The course is designed to develop sound judgment and practice in design.

Course Code	MEIE4141	Course Title	Fluid Mechanics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course covers the fundamental principles of fluid mechanics: fluid properties, fluid statics and kinematics, governing laws related to fluid flow (continuity, momentum and energy equations) and their applications, dimensional analysis, concept of laminar and turbulent flows, flow in pipe, drag and lift forces for simple bodies, introduction to compressible flows.

Course Code	MEIE4162	Course Title	Manufacturing Processes
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Introduction to manufacturing, manufacturing engineering, and manufacturing processes. Casting processes include sand casting, permanent mold casting, and disposable plaster mold casting. Pattern, mold, and die design and casting defects. Engineering metrology, dimensional tolerances, testing and inspection, and quality assurance Metal forming including rolling, forging, extrusion, drawing, and swaging processes. Welding process and technology selection.

Course Code	MEIE4122	Course Title	Engineering Systems and Control
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Introduction to control systems, mathematical models of physical systems, input-output and state variable models, characteristics of feedback control systems, design specifications of feedback control systems, stability of linear feedback systems, the root locus method, frequency response methods, stability in the frequency domain, design of feedback control systems.

Course Code	MEIE4144	Course Title	Heat Transfer
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

The course covers the fundamentals of heat transfer mechanisms (conduction, convection, and radiation): heat transfer problem analysis methodology, heat conduction equations in various geometries, one-dimensional steady heat conduction, electrical network analogy, fins, transient heat conduction, forced and free convection subjected to internal and external heat transfer surfaces, heat exchangers analysis, basic concepts of boiling and condensation.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE4188	Course Title	Data Analytics in Engineering
No. of Credit Hours	2	No. of Contact Hours	3

A short description:

This course is intended to give an introduction to Data Analytics and Machine Learning that includes: Data processing, mining, and visualization; linear and nonlinear regression, classification, logistic regression, clustering, and decision trees. The course will also cover emerging trends in Data Analytics and its applications in mechanical engineering with practical computer programming exercises.

Course Code	MEIE4285	Course Title	Engineering Economics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course introduction to engineering economics, time value of money, discounted cash flow calculations, present-worth comparisons, equivalent annual-worth comparisons, rate-of-return comparisons, structural analysis of alternatives, financial analysis, accounting and depreciation, sensitivity analysis, industrial practices, break-even analysis, expected value, and topics in engineering applications of economy.

Course Code	MEIE5149	Course Title	Capstone Design
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Capstone Design provides the senior mechanical engineering students with a realistic understanding of the design process. The course is concern with developing students' attitudes, approaches, design techniques and tools. The students will apply their knowledge to design a component and/or product by working on a term project. They will work in teams, prepare written and oral presentations, and discuss the economic, environmental, and ethical aspects of a proposed design. Main topics include: detailed design of a mechanical systems, modelling and simulation in design, materials selection and materials in design, reliability/safety, economic decision making, and communicating the design and applications.

Course Code	ENGR4007	Course Title	Industrial Training
No. of Credit Hours	0	No. of Contact Hours	-

A short description:

This training course provides an industrial or professional environment related to the field of specialization chosen by the student at the College of Engineering, providing the student with practical on-job training experience. The student in this course is assigned to an operational and professional industrial organization for a period of 8 weeks or more. In other cases, a very intensive training period of less than 8 weeks can be accepted. During this industrial training, the student acquires the necessary soft skills along with valuable professional experience needed for the labour market after graduation.

Course Code	MEIE4123	Course Title	Control Systems Design
No. of Credit Hours	2	No. of Contact Hours	4

A short description:

The course aims at equipping the students with an understanding of design of control algorithms using state-space methods and root locus, implementation of control algorithms through lab experiments and engagement in case studies through a project in order to introduce students to real control design problems.

Course Code	MEIE4163	Course Title	Modern Materials and Manufacture
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course concentrates on engineering materials and their manufacturing processes with more focus on modern and advanced materials and processes. Topics include: mechanical behaviour of materials, corrosion, and thermomechanical treatments of engineering materials. Types of engineering materials covered will be: structural ferrous and nonferrous materials, functional materials for different applications (engineering, aerospace, biomedical, energy, environmental, etc.), nanomaterials, electronic materials, magnetic materials, and smart materials. Manufacturing processes covered will be: traditional and non-traditional plastic manufacturing processes; non-traditional manufacturing (additive manufacturing, CNC machining, electrical discharge machining, powder metallurgy, etc.).

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5288	Course Title	Innovation and Entrepreneurship
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Innovation at its simple definition is the process of turning ideas into reality and capturing a value from them. In this course the student will learn how to innovate, create value which will eventually lead to start-up company. Finally, the student will learn how to manage resources i.e., money, people and equipment.

Course Code	MEIE5193	Course Title	Project I
No. of Credit Hours	2	No. of Contact Hours	-

A short description:

Final Year Project signifies the culmination of study towards a Degree of Bachelor of Science (B.Sc.) in Mechanical and Industrial Engineering (MIE). This course consists of a combination of two phases: Part I (MEIE5193) and Part II (MEIE5194). The course offers the opportunity for MIE students to apply and integrate knowledge and skills have gained throughout their studies. Students are thoroughly engaged in solving open-ended engineering design problems. The solution typically requires synthesis of design, sound judgment, technical and writing skills, analysis, creativity, innovation and cost analysis. MEIE5193 (FYP-I) topics include identifying customer/supervisor requirements; translating requirements into specifications in line with realistic constraints and design standards; generating feasible conceptual designs; selecting and testing the best concept. It puts emphases on design architectures, environmental, economic and ethical aspects. Detailed design; design for manufacturing; prototyping and testing will be carried out in MEIE5194 (FYP-II). At the end of his/her work, the student is required to submit a technical report and deliver a poster presentation.

Course Code	MEIE5145	Course Title	Design of Thermal Systems
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course is designed to focus on engineering systems that involve thermal and fluid transport. It integrates thermofluid fundamentals (thermodynamics, fluid mechanics and heat transfer) along with engineering economics, optimization techniques, and computer programming/software. It covers system design concepts, detail design, mathematical modelling, optimization techniques, steady-state analysis of components of thermofluid systems, e.g., pumps, fans, compressors, heat exchangers, turbines, cooling towers and fluid distribution networks. Students will work on the projects that focus on thermofluid system, sizing of components, overall system design and performance analysis using computer programing and/or dedicated software packages.

Course Code	MEIE5194	Course Title	Project II
No. of Credit Hours	3	No. of Contact Hours	-

A short description:

The course will focus on detail design. Teach students how to integrate knowledge from the separate courses studied previously and concurrently. The students will tackle open-ended engineering problems whose solutions require a synthesis of design, judgment, technical skills, analysis, creativity, innovation and cost analysis. Afford students the opportunities to practice their skills in preparing and presenting reports. Teach students how to design and conduct experiments, as well as to analyze and interpret data.

Major Electives

Course Code	MEIE5001	Course Title	Mechanical Program Cooperative Training-I
No. of Credit Hours	0	No. of Contact Hours	-

A short description:

COOP-I program is designed to bridge the gap between academia and industry in Oman. The training framework of the program is designed in such a way to align the students' competencies with the industry needs and also assure an efficient follow up and tracking of the students' progress. Such training program will allow students to apply and enhance their engineering knowledge and skills learned at the university in a real professional environment that requires technical expertise, teamwork, interpersonal skills, leadership, creativity, work ethics, organizational, cultural and professional networking skills. Furthermore, the training program will increase students' self-confidence and provide them with additional skills required by industry in real work environments. This will complement the knowledge acquired in the classroom through "Learning by Doing".

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5002	Course Title	Mechanical Program cooperative Training-II
No. of Credit Hours	6	No. of Contact Hours	-

A short description:

COOP-II program is designed to bridge the gap between academia and industry in Oman. The training framework of the program is designed in such a way to align the students' competencies with the industry needs and also assure an efficient follow up and tracking of the students' progress. Such training program will allow students to apply and enhance their engineering knowledge and skills learned at the university in a real professional environment that requires technical expertise, teamwork, interpersonal skills, leadership, creativity, work ethics, organizational, cultural and professional networking skills. Furthermore, the training program will increase students' self-confidence and provide them with additional skills required by industry in real work environments. This will complement the knowledge acquired in the classroom through "Learning by Doing".

Course Code	MEIE5013	Course Title	Refrigeration and Air Conditioning
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Low temperature applications in industry are studied by the thermodynamics learned in previous courses. Control of the environment temperature and humidity is fundamental to many industrial processes. How to do this involves learning refrigeration and humidification operations learned in these lectures and laboratory work. Computer methods are used for design and prediction of performance.

Course Code	MEIE5128	Course Title	Theory & Practice of Rotor Dynamics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Rotating shafts are employed in industrial machines such as steam and gas turbines, turbogenerators, internal combustion engines, reciprocating and centrifugal compressors for power transmission. The shafting of these machine installations is subjected to torsional and bending vibration and possibly unstable operation. This demands careful study of the vibratory motion of such systems. The main objective of this course is to study the basic of rotor dynamics with the help of simple rotor models and to demonstrate a number of methods available for calculating the complete dynamical performance of rotors - solving and discussing problems such system critical speeds, forced response, dynamic stability, Influence of bearings on rotor vibrations, balancing and condition monitoring. Main Topics: 1. Overview on Rotor Dynamics History and Recent Trends 2. Modelling Simple Rotor Systems and Bearing Systems 3. Simple Rotor-Bearing-Foundation Systems 4. Simple Rotor Systems with Gyroscopic Effects 5. Torsional Vibrations of Rotors 6. Transverse Vibrations of Rotors 7. Instability in Rotor Systems 8. Balancing of Rotor Systems 9. Signal Processing in Rotating Machineries 10. Vibration Based Condition Monitoring in Rotating Machineries.

Course Code	MEIE5019	Course Title	Internal Combustion Engines and Control
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This advanced course teaches students how to apply the fundamentals they have learnt to the practical field of Internal Combustion Engines. The course of lectures and experimentation cover both petrol and diesel engines. Fuel, ignition, cooling and lubrication systems are student. The formation and control of exhaust emissions are discussed on the basis of combustion characteristics and performance requirements.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5101	Course Title	Engineering Vibration
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

The main objective of this course is to study the mechanisms of generation and transmission of machinery vibration. The flexibility of the mechanical components and damping mechanisms are taken into account in designing methods of reduction and isolation of vibration in machines. Main Topics: Physical effects of vibration and noise, international standards on limits of vibration and noise exposure, sources of vibration, Critical speeds of rotating shafts; Vibration of single degree of freedom systems -free and forced harmonic vibration - rotating unbalance, support motion, vibration isolation, structural damping; Two degree of freedom systems - free and forced vibration-undamped and damped, vibration absorber; Multi-DOF systems- flexibility matrix, stiffness matrix, eigenvalue problem-approximate methods of calculation; torsional systems; Vibration measurement and analysis- vibration measuring instruments-accelerometers, charge amplifiers, analysis of vibration signals - FFT analyzers, vibration testing, modal data extraction; case studies.

Course Code	MEIE5106	Course Title	Pressure Vessels and Piping System Design
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course includes introduction to axial, bending, shear stresses, stress-strain relations, equilibrium equations, failure criteria, stresses in pressure vessels, general design guidelines, design of vessels and piping supports, stresses in cylindrical shells, piping systems, storage tanks, introduction to equipment related to pressure vessels and piping, introduction to various standards such as ASME pressure vessels, ANSI, API, etc., case studies of typical engineering design problems.

Course Code	MEIE5110	Course Title	Applied Finite Element Methods
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course introduces students to the fundamental concepts of the finite element method (FEM), and how to use this powerful design and analysis tool to tackle common mechanical engineering problems. The first half of the course will cover the fundamentals of FEM. The second half will focus on the application of the method. The course emphasizes the various methods of FE modelling and includes practical case studies in which problems are solved and critically examined by means of available commercial software. Main Topics: Review of matrices, linear algebra, interpolation, numerical differentiation and numerical integration. Displacement based finite element formulation (1-D & 2-D), Isoperimetric elements, High order elements, Incompatible elements, Convergence, Solutions of equations, Post processing, Finite element Modeling, Application of FEM to static and dynamic problems.

Course Code	MEIE5121	Course Title	Modelling and Simulation of Engineering Systems
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course covers the "art" and "science" of translating the behaviour of a physical system to an abstract description of that system in the form of differential equations. This course provides students with the "Bond Graph" methodology, utilized for the unified modelling, analysis and synthesis of engineering systems. This course will introduce students not only to the simple building blocks from which models (for hybrid systems) can be constructed, but also to the mindset with which a modelling challenge must be approached.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5122	Course Title	Applied Multibody Dynamics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

The basic course in dynamics or Basic Mechanics often deals well with the dynamics of one rigid body. In this course, a systematic approach to the generation and solution of equations of motion for interconnected rigid bodies will be covered. The systems studied consists of multiple interconnected rigid bodies (Robots, beam pump, walking machines,) the so-called multibody systems. The course covers derivation of the equations of motion using Newton/Euler equations; angular momentum principle; Kane's method; and Lagrange's equations, with more focus on using Kane's method. It will also cover Numerical solutions of nonlinear algebraic and differential equations governing the behaviour of multiple degree of freedom systems; Symbolic and numerical computational methods; Computer simulation of multi-body dynamic systems using tools such as MATLAB, and the multibody dynamics analysis program AUTOLEV; Treatment of holonomic and nonholonomic constraints, the extraction of data from equations of motion, and computational issues.

Course Code	MEIE5124	Course Title	Condition Monitoring and Diagnosis
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course includes Maintenance Strategies (Policies), Critical Machinery, Common machinery failures, Root-causes of, Economics of Maintenance, Machinery Reliability, Condition Monitoring: Observation, Vibration, Acoustic Emission, Ultrasound, Performance, Oil Analysis, Oil Debris Analysis, Thermography, and Corrosion. Condition Monitoring Instruments, Data Acquisition systems, Time and Frequency Domain Analysis of Signals, Statistical Analysis of signals, Trending, Machinery Failures and Diagnostics, Computerized Maintenance Management Systems.

Course Code	MEIE5127	Course Title	Analysis and Design of Control Systems
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

The aim of this course is to provide the student with a clear exposition of the basic principles of frequency-and-time analysis and control design with more emphasis on design for real world applications. The main topics are linear control systems analysis and design in transform domain and time domain, transfer functions and state equations, Frequency response and Nyquist stability, Loop shaping. State feedback controller and observer design, applications to mechanical and mechatronics systems and Computer control.

Course Code	MEIE5129	Course Title	System Models and Identification
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course focuses on data-driven modelling of systems, with emphasis on engineering systems. The course starts with introduction of different models in terms of being dynamic or static and being white, grey or black box. This course assumes a completely empirical description of the dynamics of the system for which essentially no information is known a priori (black box approach) and identify a "model" by observing input/output data. Common discrete models are introduced. The models should be discrete as the data imported to the computer are discrete. The rest of the course is about techniques to identify and cross-validate model characteristics and parameters.

Course Code	MEIE5130	Course Title	Mechatronics Systems and Applications
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Mechatronics is an interdisciplinary field that integrates Mechanical, Electronics, Control and Computer Engineering in the design of systems and products. The course deals with basic of sensors, actuators, measurements, electronics, microprocessors, programmable logic controllers (PLC), feedback control, robotics and their implementation. The course includes provide hands on working knowledge of real time programming, computer interfacing, mechanical design and fabrication.

Course Code	MEIE5131	Course Title	Legged Locomotion of Robots and Animals
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Introduction to the biomechanical analysis of terrestrial Locomotion based on the mechanical laws of motion. The course covers legged locomotion, as they apply to robots and animals. Topics include Passive Dynamics in Legged Locomotion, Spring like models and running, Raibert Hopping Robots, Energetic of Locomotion, Introduction to Control and Optimality in Locomotion, ZMP and Capture Point Method.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5132	Course Title	Smart Materials and Structures
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Generalized configurations and functional descriptions of smart materials, Review of Maxwell Equations, Design of Permanent Magnet circuits and applications, Modelling and dynamic characteristics of 1st and 2nd order systems, Principle of magnetostrictive/piezoelectric materials and their effects, Design of magnetostrictive/piezoelectric actuators, mechanical and electromagnetic analysis of the magnetostrictive/piezoelectric actuators using finite element method (FEM) for both resonant and non-resonant actuators, Design of magnetostrictive/piezoelectric sensors, Electromagnetic analysis of the magnetostrictive/piezoelectric sensors (displacement, temperature, force sensors, accelerometer) using FEM, Static and dynamic characteristics of actuators and sensors. Main Topics: Generalized configurations and functional descriptions of smart materials, Review of Maxwell Equations, Design of Permanent Magnet circuits and applications, Principle of magnetostrictive/piezoelectric materials and their effects, Design of magnetostrictive/piezoelectric actuators, Design of magnetostrictive/piezoelectric sensors, Electromagnetic analysis of the magnetostrictive/piezoelectric sensors, Case studies.

Course Code	MEIE5141	Course Title	Solar Energy Systems
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

The course aims at providing the student with solar energy fundamentals and applications. The course includes Solar geometry, extraterrestrial radiation, solar radiation measurement and estimation. Solar thermo collectors and storage solar thermal system performance. Solar cooling, solar thermal power systems, solar desalination. Solar PV principles and applications.

Course Code	MEIE5142	Course Title	Solar Thermal Processes
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course introduces mechanical engineering students to the fundamentals and principles of solar thermal processes which will qualify them for modelling and designing solar thermal systems that works on solar energy. The course focuses on solar radiation calculations and the modelling of solar thermal processes using flat-plate collectors and concentrating collectors.

Course Code	MEIE5146	Course Title	Renewable Energy
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course introduces through a balanced handling of theory of the fundamentals of renewable energy processes and engineering application of basic principles of renewable energy sources, such as solar energy and solar radiation, energy from the ocean, tides energy, geothermal energy, biogas production, photo voltaic, fuel cells, wind energy and fission and fusion reactions.

Course Code	MEIE5147	Course Title	Energy Conservation and Management
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course introduces the energy conservation and energy management principles and covers fuels and energy use, forms of energy, trends in energy demand and impact on environment, sustainability and renewable energy sources, review of thermo-fluids science, power cycles and efficiency measures, waste energy recovery and cogeneration in steam and gas turbines and other energy systems and processes. It also covers energy management, energy auditing procedures, tools and instrumentation, energy saving opportunities in industrial as well as building energy systems, electrical motors and variable speed drive and power factor. Students will be exposed to real-world energy conservation and management problems by conducting energy audit of actual energy systems and analysis and economic assessments of alternative technologies of energy consuming systems or processes.

Course Code	MEIE5148	Course Title	Desalination
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course covers: Water resources, Chemistry of saline water, thermal desalination, Reverse Osmosis, Scale formation; pre-and post-treatment operations. Economic consideration of various desalination processes.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5151	Course Title	Fundamentals of Turbomachinery
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

The course introduces the fundamentals of turbomachines machines including pumps turbines and compressors. Comprehension of dynamics of the turbomachinery and its industrial applications. The understanding of the concept fluid power transformation and design of fluid machines. Introduction to fundamentals of turbomachinery design and selection process as per the industrial requirements, standards and codes.

Course Code	MEIE5152	Course Title	Fundamental of Thermal Energy Storage Systems
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course is intended to provide students with an overview on energy storage schemes/devices and a discussion of how energy storage systems can be used to benefit the energy efficient concept. The course will explain the engineering concepts, operating principles, physics behind them, characterization methods and advantages of each energy storage system. Main Topics Some of the topics that may be covered are: Energy Storage: History and General Concept. Thermal energy Storage Methods. Thermal energy Storage and Environmental Impact. Thermal Energy Storage Applications. System Modelling and Analysis. System Optimization. System Characterization and Case Studies.

Course Code	MEIE5162	Course Title	Corrosion Engineering
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Corrosion engineering course provides the students with a fundamental understanding of corrosion through discussion of electrochemistry, the forms of corrosion, the method of testing, and protection techniques. The corrosion and related chemical properties in general are also introduced as a main topic in the course. The design implications of selecting materials for corrosion resistance are discussed too. Term papers, case studies and projects are used to enhance the students understanding and introduce them to the real problems in the field of engineering.

Course Code	MEIE5166	Course Title	Introduction to Nanotechnology Engineering
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course will introduce the basic concepts of nanotechnology. The course will cover the following topics: introduction to nanotechnology, nano-materials classes and fundamentals, properties, synthesis and characterization, nano fabrication techniques, introduction to MEMS and NEMS sensors, nanotechnologies in health and environment.

Course Code	MEIE5165	Course Title	Introduction to Fracture Mechanics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This elective undergraduate course provides a basic understanding of Fracture Mechanics, the study of propagation of existing cracks leading to failure. It is aimed at a basic understanding of the causes of fatigue and fracture failure, design against fracture, and methods of failure prediction. This can be a useful course for students of Mechanical, Civil, and Aerospace Engineering, and Material Science. Some of the topics that may be covered are: Introduction and historical background of fracture mechanics; Fracture mechanics approach to design; Linear elastic fracture mechanics (LEFM); Elastic-plastic fracture mechanics; Introduction to fatigue crack growth; LEFM Applications; Elastic-plastic applications; Fracture mechanisms in metals and alloys; Fracture toughness testing.

Course Code	MEIE5167	Course Title	Mechanics of Composite Materials
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This is a technical elective undergraduate course. The course provides an introduction to the mechanics of anisotropic, inhomogeneous composite materials; anisotropy of stress and the general equations of the theory of elasticity and thermoelasticity of the anisotropic 3D solids. The class introduces classification of composite materials, fabrication processes and applications of composites, and micro- and macro-mechanical modelling of composite materials. The elastic behaviour of laminated and fibre-reinforced composites is studied; the effective moduli theory is considered. The fundamentals of fracture mechanics and the applications of fracture mechanics to the mechanical design are introduced. Topics on strength and fracture of composite materials are also covered. Use of computer modelling for the analysis of practical examples of composite is considered. This can be a useful course for students of Mechanical, Civil, and Aerospace Engineering, and Material Science.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5168	Course Title	Introduction to Polymers
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Introduction to Polymers is a senior-level course for mechanical engineering students which covers the basics of polymeric materials for engineering design. The course starts by explaining the molecular structure of polymers and its role in the broad classification of polymers to thermoplastics and thermosets. Main topics covered are; the fundamental chemistry of polymerization, physical and mechanical properties of polymers, thermal behaviour of polymers, polymer composites, experimental testing of basic polymer properties, manufacturing techniques of polymers (injection molding, extrusion, compression molding, 3D printing), comparison of polymers to metals and ceramics, viscoelastic nature of polymers, design calculations of polymers in design (static and dynamic loading).

Course Code	MEIE5169	Course Title	Fundamentals of Sustainable Engineering
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Renewability and sustainability are some of the greatest engineering challenges in the coming years. This course is a basic introduction to the theory and practice of sustainable engineering. Topics may include (but are not limited to): Introduction and history of sustainable engineering; Renewability, sustainability, and recycling; Design for sustainability; Energy-efficient systems and technologies; Green manufacturing and processes; Materials selection for sustainability; Renewable energy systems; Climate change mitigation and adaptation; Life cycle analysis and environmental impact assessment; Maintenance and sustainability; Regulations and standards; Case studies and innovations; Future trends and challenges

Course Code	MEIE5182	Course Title	Fundamentals Of Biomechanics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Biomechanics is the study of the structure and function of biological systems using principles of mechanics. This course is designed to build the concepts of the students to apply engineering knowledge to biological systems and analyzing them. The course integrates principles of engineering mechanics and anatomical components to evaluate forces and associated deformations in biological tissues. Kinematics and kinetics of the musculoskeletal systems will be discussed. Specific topics will include description of musculoskeletal system, analysis of forces in various joints and muscle groups, study of human walking and postures, measurements and analysis of stress and strain in biological tissues, energy and power in human activity. The course will provide opportunity for students to prepare themselves to attend graduate school in biomedical engineering, industrial positions in biotechnology and clinical research centres.

Course Code	MEIE5183	Course Title	Emerging Technologies in ME
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Emerging technologies are characterized by radical novelty, relatively fast growth, prominent impact, and uncertainty. This course will explore current breakthrough technologies that have emerged over past few years and its impact on industry, business, and society. Big data, machine learning, artificial intelligence, internet of things, robotics, virtual reality, etc. are few topics that will discussed with applications in Mechanical Engineering discipline.

Course Code	MEIE5184	Course Title	Bioinspired Design for Engineers
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Bio-inspired Design is studying the structure and function of biological systems as models and designing or engineering new materials and machines. This is a project-based course where students have to design a bioinspired system. Topics include: introduction to bioinspired design and biomimetic, biological materials vs bioinspired materials, bioinspired robots, steps in biomimetic method, bioTRIZ, biomimicry design challenge, bioinspired economy - circular economy, biologically inspired computation-ant colony optimization and others. Lecture notes, reading materials and references will be provided to students.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5190	Course Title	Special Topics
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course will teach students the state-of-the-art topics in mechanical engineering. The course will focus on recent advances and their applications to solve real world engineering problems in the field of mechanical engineering. Emphasis will be given to use experimental and/or computational tools to find viable engineering solutions. A term project will allow the students, at the same time, to apply the knowledge gained in the class. Main Topics: Head of the Department of Mechanical & Industrial Engineering will approve topics with the concern instructor.

Course Code	MEIE5264	Course Title	CAD/CAM
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course is designed to address the geometric modelling, using selected CAD/CAM packages to graphically model parts in 2D, 3D wire-frame and solid; graphic display manipulation; geometrical analysis; graphic and data files management; exchange, and conversion of graphic files to standardized formats such as DXF, IGES. Generating G-codes, post processing G-codes into formats interpretable by given CNC controllers. Editing G-Codes with verification of validity of tool paths in 3D and solid graphical simulation. Disciplines of the numerical control hardware. Rapid prototyping, automation in CAM, integration of machine vision with CAM and applications in manufacturing and data communications.

Course Code	MEIE5233	Course Title	Maintenance and Reliability Engineering
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

Fundamental concepts of reliability; analysis of failure data; reliability models, reliability of systems; reliability testing; maintainability and maintenance models; computer applications.

Course Code	MEIE5287	Course Title	Project Management
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This is an intermediate course in the area of project management, with an emphasis on short to intermediate term decision making and quantitative techniques. The course introduces the key activities for project success and help to identify and understand the importance of key people in every project. Project planning, budgeting and cost estimation for a project are covered in details. Furthermore, the knowhow required to achieving timely completion of projects through proper scheduling is addressed. In addition, the course covers the important aspect of identifying, assessing, and controlling risk throughout the execution of projects.

College Electives

Course Code	COMP2002	Course Title	Introduction to Computer Program for Engineer
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course is intended to introduce the engineering students to software development using a high-level programming language. Course contents include: problem solving methodology, program structure, language syntax, variables, data types, control flow, functions, data files, arrays, and variable scope.

Course Code	ENGR2217	Course Title	Programming for Engineers
No. of Credit Hours	3	No. of Contact Hours	4

A short description:

This course is intended to develop students' computer skills in writing and implementing computer programs applied to engineering problem solving using high level programming language such as C or C++. The course contents target the following themes: computing basics, algorithmic thinking, program structures and applied programming for engineering problem solving.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code:	MEIE2182	Course Title	Workshop II
No. of credit hours	0	No. of Contact hours:	2

A short description:

As well as giving an extensive grounding in theoretical aspects of engineering, the professional engineer needs to appreciate the methods by which things are made and to understand and respect the skills involved in these processing. An elementary knowledge of manufacturing techniques is an essential for many undergraduate courses, so that some workshop experience is now regarded as necessary before starting an engineering course or in the initial year of that course. This course gives a "hands on" element in the workshop environment (using lathe, milling, drilling machines and other cutting machines). It also introduces the various welding techniques.

Course Code	MEIE2102	Course Title:	Statics
No. of credit hours	3	No. of Contact hours:	4

A short description:

Statics is a fundamental course for engineering students. The objective of the course is to introduce the Mechanical Engineering Students to the basics of equilibrium conditions of particles and rigid bodies. The course will integrate the knowledge of the students in the fields of mathematics and physics to understand nature of forces and moments; friction and structural mechanics; centre of gravity and moment of inertia. The course will cover basic force and moment vectors, equilibrium of particles and rigid bodies, structural analysis, centre of mass and moment of inertia.

Course Code	MEIE3121	Course Title	Dynamics
No. of credit hours	3	No. of Contact hours:	4

A short description:

This course includes 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 in particles and rigid body dynamics, and principle of impulse and momentum in particle and rigid body dynamics.

Course Code	MEIE3107	Course Title	Engineering Draw & Graph
No. of credit hours	3	No. of contact hours:	4

A short description:

Engineering drawing is the technical language of engineers and technicians in academic or industrial settings. This course provides introduction to the theory and standards of technical drawings, computer aided solid modelling. The course covers theory of technical drawing and modelling of two and three-dimensional objects. Topics covering theory are: conventions and standards of engineering drawing, sketching techniques, theory of projections, rules of dimensioning, auxiliary views, isometric views, pictorial views and tolerancing. The course extensively covers two and three-dimensional modelling using latest CAD programs. Student will create solid models of parts and assembling them through several tutorial sessions. Modifying geometry, dimensioning, storing and retrieving predefined shapes, generating multiviews, designing and manipulating drawing sheets are also taught.

Course Code	MEIE4190	Course Title	Seminar
No. of credit hours	0	No. of contact hours:	1

A short description:

Presentations on current engineering topics and industrial practices. The course reflects current trends in research and development in Mechanical Engineering, and emerging industrial applications of Mechanical systems. Students will choose a topic for presentation in consultation with a faculty member as seminar advisor. The students will collect the literature, read it, prepare a summary of it and present it in the seminar.

Course Code	MEIE3161	Course Title:	Material Science
No. of credit hours	3	No. of contact hours:	4

A short description:

This course is designed to introduce the students to Materials Science and Engineering. Topics covered include the following: Atomic and Crystal Structures, Imperfections in crystalline materials, Mechanical properties of materials, fracture of metallic materials, phase diagrams and corrosion. In addition, engineering materials (e.g., alloys, polymers, ceramics, composites and advanced materials) and their properties and applications are introduced to the students.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE4161	Course Title:	Engineering Materials
No. of credit hours	3	No. of contact hours:	4

A short description:

This course concentrates on engineering materials, their properties and use in design or performance enhancement. Topics include: classification of engineering materials, their properties, and behaviour; metal and alloys, plastics and rubber, ceramics; composites, manipulation of material properties; Ashby method for material selection; emphasis on Mechanical Engineering applications. For metals: effects of work hardening and heat treatment, corrosion, and elevated temperature properties; For plastics and rubber: viscoelasticity, stress relaxation and creep, and phase transitions; For ceramics: flaw-dominated strength, fracture energy, and statistical determination of strength; For composites: thermal and environmental effects on properties, tailoring material properties for specific applications.

Course Code	MEIE4102	Course Title	Machine Design
No. of credit hours	3	No. of contact hours:	4

A short description:

This course deals with design of basic machine elements. The course is intended to present the fundamental theory of machine design and teach students how to design and analyze machine components. It utilizes the background of knowledge in mechanics of materials and properties of materials. It gives the student straightforward tools for stresses, strains and strengths analyses of machine components subjected to axial, torsional, bending and combined loading. The course starts by introducing students to the various types of stresses and the different types of failure theories of static and cyclic loading conditions. The course will then cover the various methods of designing different machine components such as springs, shafts, gears, screws and bearings using appropriate fundamentals and failure theories. The domains of applicability of the course fundamentals in a wide range of engineering applications are also discussed. Emphasis is placed on design and not simply on problem solving or analysis. This course is designed to develop sound judgment and practice in design.

• BSc. in Industrial Engineering

Course Description

Course Code	HIST1010	Course Title	Oman and Islamic Civilization
No. of Credit Hours	2	No. of Contact Hours:	2

A short description:

This course is a comprehensive survey of the role of Oman in Islamic civilization including an historical and geographical introduction to Oman before Islam; the efforts of the Omanis in spreading Islam; study of aspects of Islamic civilization, and Oman's role.

Course Code	ISLM1010	Course Title	Islamic Culture
No. of Credit Hours	2	No. of Contact Hours:	2

A short description:

This course aims at teaching students the main constituents of Islamic Culture. The course studies the concept of Islamic culture, its sources, characteristics and constituents. Moreover, it focuses on God, the Universe, human being, life etc.

Course Code	ENGR1501	Course Title	Introduction to Engineering
No. of Credit Hours	1	No. of Contact Hours:	4

A short description:

This course is a summary of all the engineering disciplines in which undergraduate engineering degrees are offered at the Sultan Qaboos University (College of Engineering). Students will be familiarized not only with the fundamentals of each discipline but will also be enlightened by the experiences of engineering professionals in the industry. This would enable students to get a glimpse of each engineering discipline and will also give an idea of what to expect as an engineer once they graduate. There will be lectures and seminars on topics listed in this course outline.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	ENGR1600	Course Title	Workshop I
No. of Credit Hours	1	No. of Contact Hours:	2

A short description:

As well as giving an extensive grounding in theoretical aspects of engineering, the professional engineer needs to appreciate the methods by which things are made and to understand and respect the skills involved in these processes. An elementary knowledge of manufacturing techniques is essential for many undergraduate courses, so that some workshop experience is now regarded as necessary before starting an engineering course or in the initial year of that course. This course gives a “hands on” element in the workshop environment.

Course Code	CHEM1071	Course Title	General Chemistry for Engineering
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

This is an introductory survey course designed to give engineers an appropriate background in chemistry. It includes topics such as atomic structure, bonding, states of matter, energy changes, reaction kinetics and equilibrations in solution, and the periodic table.

Course Code	LANC2160	Course Title	English for Engineering I
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

The aim of upper intermediate course is to develop the study and language-related skills required by engineering students in order to deal with their academic studies. The course teaches the academic reading and writing skills associated with the most common language functions found in general scientific English, such as generalizing, describing, defining, classifying and hypothesizing.

Course Code	MATH2107	Course Title	Calculus I
No. of Credit Hours	4	No. of Contact Hours:	4

A short description:

This is the first standard calculus course of three. It presents practical and theoretical aspects related to: Limits and continuity, derivatives, functions (logarithmic, exponential, trigonometric, hyperbolic) and integration. The course also introduces Computer Algebra Systems CAS and their uses to the students.

Course Code	ARAB1060	Course Title	Arabic
No. of Credit Hours	2	No. of Contact Hours:	3

A short description:

This course is based on the study and analysis of a number of different poetic and prose texts in the various religious, national, scientific, legal, economic, linguistic, etc. fields identified in the approved university textbook. The course involves the study of the fundamentals of Arabic language in a manner that helps to understand and absorb texts, describe their aesthetic and critical properties, analyze linguistic structures- in form and composition, significance and style- to identify the most prominent linguistic and rhetorical styles along with knowledge of some morphological, grammatical and rhetorical aspects and written techniques (spelling and punctuation). The course aims to train students to deal with the texts and exercises contained in the approved textbook.

Course Code	SOCY1005	Course Title	Contemporary Omani State and People
No. of Credit Hours	2	No. of Contact Hours:	2

A short description:

The aim of the proposed course is to enhance students' awareness of identity, values of the Omani society, and to help students understand the role played by heritage, historical, demographic, cultural, and institutional variables in shaping and characterizing the Omani identity. The course also aims to shed light on the State's administrative system and the foundations of the Omani Renaissance, and its indicators based on the thought of His Majesty Sultan Qaboos bin Said and his distinctive approach in building the nation and people.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	LANC2161	Course Title	English for Engineering II
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

The aim of this advanced course is to further develop the study and language-related skills required by engineering students in order to deal with their academic studies. The course develops academic reading and writing skills at an intellectually challenging level. Classwork, group projects, and self-access assignments are included.

Course Code	MATH2109	Course Title	Calculus II for Science and Eng.
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This is the second course in a series of three Calculus courses. The course builds on the topics taught in Calculus I, and deals primarily with applications of integration such as calculating volumes, length of curves and surface areas, the techniques of integration of various functions, and proper and improper integrals. It also deals with sequences, series and their convergence, power series and their convergence as well as differentiating and integrating power series. The course ends with the introduction of polar coordinate system, polar curves and some basic polar calculus.

Course Code	PHYS2107	Course Title	Physics for Engineering I
No. of Credit Hours	4	No. of Contact Hours:	6

A short description:

An introductory course that develops a sound understanding of the basic physical principles underlying natural phenomena related to translational dynamics, rotational dynamics, statics and fluids using elementary calculus and experimental techniques. The emphasis is on developing an intuition for the behaviour of physical systems and problem solving.

Course Code	MEIE3281	Course Title	Probability and Statistics for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course emphasizes on the role of probability and statistics in engineering. The course will cover data summary and presentations; Introduction to probability; Discrete and continuous probability distributions; Hypothesis testing; Curve fitting, regression and correlation; Introduction to statistical quality control. Also, the use of computer applications in statistical analysis is emphasized. The examples and exercises strongly focus on engineering applications.

Course Code	MATH3171	Course Title	Linear Algebra and Multivariate Calculus for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Many physical quantities have a vectorial representation, and vector analysis often simplifies calculations considerably. The current course introduces the student to vector algebra, matrices and determinants, vector differential calculus, line and surface integrals, and divergence theorems.

Course Code	PHYS2108	Course Title	Physics for Engineering II
No. of Credit Hours	4	No. of Contact Hours:	6

A short description:

An introductory course that develops a sound understanding of the basic physical principles underlying natural phenomena related to electricity and magnetism and heat and thermodynamics using calculus and experimental techniques. The emphasis is on developing an intuition for the behaviour of physical systems and problem solving.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE3103	Course Title	Engineering Tools and Graphics
No. of Credit Hours	2	No. of Contact Hours:	3

A short description:

This course introduces the fundamentals of computer/machine tools. The course will enable students to have practical skills in engineering drawing, basic programming and workshop practice. The course covers CAD and drafting, programming and basic machining operations. Topics include: Introduction to MATLAB/ LabVIEW; CAD drawing (2D & introduction to 3D modelling/assembly); Measurement tools; Machining, Drilling, Welding etc.; 3D printing and ideas for sheet metal working. Students will perform various hand and machine tool operations under staff supervision and build and test a project.

Course Code	MEIE3203	Course Title	Introductory Applied Mechanics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The objective of the course is to introduce students to the basics of mechanics of materials. The course starts by introducing students to the concepts of force, moment, resultant, free body diagram, equilibrium state, friction, centroid, first and second moment of area. After that, these basic concepts in mechanics will be extended to the study of deformations and stresses in engineering structures. The study covers axial, torsion, bending, and shear loads (also shear and moment diagrams) with their associated normal and shear stresses. Then all the load modes are combined in a realistic engineering problem where some or all of them exist in the same system. This combined loading problem is then further analyzed with stress transformations (Mohr's circle) to calculate principal and maximum shear stress. Special topics like pressure vessels and column buckling are also covered.

Course Code	MEIE3292	Course Title	Work System Analysis and Design
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The objective of this course is to provide students with skills in systematic analysis of work methods, work measurement and work design to improve productivity. Topics include Methods Engineering concept; Methods analysis tools and techniques, Methods improvement principles, Charting methods, Operations analysis; Motion study and Work measurement techniques, Time study, performance rating and allowances, Predetermined time system, Work sampling; Standards development. The course contains a term project, where the students work on teams to study a real-life task to improve it.

Course Code	MEIE3284	Course Title	Industrial Information System
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Industrial Information Systems presents a body of knowledge applicable to many aspects of industrial and manufacturing systems. This course provides a background in, and an introduction to, the relevant information technologies and shows how they are used to model and implement integrated IT systems. Course topics include introduction to database concepts, tables, relationships, keys, Data modelling. Tools; MS-Access, SQL etc. Applications development industrial case studies.

Course Code	MEIE3279	Course Title	Theory of Modelling and Optimization
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course introduces the concepts of LP modelling and its applications in engineering, explores the mathematical properties of general LP problems and studies the theory of the simplex algorithm as a solution technique. A strong emphasis is given on modelling of linear programs and use of commercial solvers to solve such models. Other topics include the simplex method, duality theory, sensitivity analysis, network flows, and project scheduling.

Course Code	MATH4174	Course Title	Differential Equations for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Differential Equations of the first order, linear differential equations, Laplace transformation, Fourier series, Fourier transforms and partial differential equations.

Course Code	MEIE3276	Course Title	Mechatronics Systems
No. of Credit Hours	2	No. of Contact Hours:	4

A short description:

The aim of this course is to provide the student with a foundation in dynamics, instrumentation and control systems by doing several projects. First, an understanding of control system components, such as sensors and associated instrumentation systems, actuators, and power amplifiers, will be developed while working on a number of projects. The course will provide students with hands-on working knowledge of real-time programming, computer/microcontroller/sensor interfacing, actuators' control, etc.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE4229	Course Title	Integer and Stochastic Optimization in Practice
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course extends the mathematical methods of deterministic linear optimization to include integer decisions and stochastic nature of the problems. It introduces the concepts of integer and stochastic modelling together with their solution algorithms. Topics include integer programming, goal programming, decision theory, queuing theory, and game theory.

Course Code	MEIE4263	Course Title	Materials and Manufacturing Technology
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Introduction to materials science and engineering and to basic manufacturing processes. Materials topics include: materials classifications, solidification and defects of metallic materials, plastic deformation, alloying and phase diagrams, metallic materials, polymers, and, composites. Basic manufacturing processes like casting processes, metal forming processes including rolling, forging, extrusion, drawings and joining will be covered. The course will also cover engineering metrology, dimensional tolerances, testing and inspection, and quality assurance.

Course Code	MEIE4219	Course Title	Optimal Experimental Design
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Design and analysis of variance, single-factor experiment, simple linear regression and correlation; several factors (factorial experiments); multiple linear regression two-level factorial designs, and two-level fractional factorial designs. Use of computer applications in statistical analysis. The examples and exercises strongly emphasize engineering applications through software packages.

Course Code	MEIE4288	Course Title	Data Science and Engineering Analytics
No. of Credit Hours	2	No. of Contact Hours:	4

A short description:

This course is intended to give an introduction to Data Analytics and Machine Learning that includes Data processing, mining and visualization; linear and nonlinear regression, classification, logistic regression, clustering and decision trees. The course will also cover emerging trends in Data Analytics and its applications in industrial engineering with practical computer programming exercises.

Course Code	MEIE4285	Course Title	Engineering Economics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course introduces engineering economics, time value of money, discounted cash flow calculations, present-worth comparisons, equivalent annual-worth comparisons, rate-of-return comparisons, structural analysis of alternatives, financial analysis, accounting and depreciation, sensitivity analysis, industrial practices, break-even analysis, expected value, and topics in engineering applications of economy.

Course Code	MEIE4233	Course Title	Production Planning and Inventory Management
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Production planning and control is an important issue in manufacturing systems often involving the handling of the complex process and large volumes of data. Fast and accurate response is required to improve the quality of decision-making. This is an introductory course in the area of analysis and control of production systems, with an emphasis on short to intermediate term decision making and quantitative techniques.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE4201	Course Title	Ergonomics and Safety
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The objectives of this course are to expose students to the field of Ergonomics/Human Factors engineering so as to enable them to identify safety problems and their nature as they relate to the human involved and to develop skills in ergonomic design for improved efficiency, health and safety. Topics include Ergonomics/Human Factors Engineering concept; Human capabilities and limitations: Anthropometry, Physiology and Biomechanics; Manual work design; Workplace, equipment and tool design; Human-machine-environment system design: Design and layout of controls and displays; Physical environment; Ergonomics assessment and implementation of ergonomics programs.

Course Code	MEIE4286	Course Title	Engineering Management
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The intent of this course is to provide some insight into the nature of management in which the engineer is most likely to encounter the need for an understanding of Management as his career processes. Introduction to Engineering Management with emphasis on the management functions of planning, organizing, motivating, controlling and leading. The nature and types of decision making are also discussed.

Course Code	MEIE4255	Course Title	Facilities Design and Planning
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Introduction to facilities planning; requirements for facilities design, flow, space and activity relationships, personnel requirements; facility layout models; computerized layout planning; material handling systems; facility location; warehouse design, selecting and implementing facilities plans.

Course Code	MEIE4244	Course Title	Quality Engineering and Management
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course provides students with the statistical tools necessary to solve quality problems in the manufacturing and service industries. The course covers introduction to the philosophy and basic concepts of quality improvement; control charts for variable and attribute data; process capability assessment; acceptance sampling procedure. The course also introduces students to modern quality management systems and philosophies, ISO 9000, total quality management (TQM); and computer applications to statistical quality control.

Course Code	MEIE4272	Course Title	Simulation Models
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

In this course students will learn the theoretical background of simulation and how to apply it to real world systems. This course deals with this category of systems. Topics will include modelling techniques, introduction to queuing theory, random number generators, discrete-event simulation, Monte Carlo simulation, simulated data analysis, and simulation variance reduction techniques. Students will learn how to use integrated simulation/animation environment to create, analyze, and evaluate realistic models using simulation software (ARENA).

Course Code	MEIE5273	Course Title	Product design and Manufacturing
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course examines the process of new product development from an interdisciplinary standpoint (business, engineering, and industrial design and manufacturing). Product design and development, concept generation and selection, parametric feature-based CAD, design for manufacturability (DFM) and assembly (DFA), The cornerstone is a project in which teams of management, engineering, and industrial design students conceive, design, and prototype a physical product. Topics include identifying customer needs, concept generation, product architecture, industrial design, and design-for-manufacturing.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	ENGR4007	Course Title	Industrial Training
No. of Credit Hours	0	No. of Contact Hours:	-

A short description:

This training course provides an industrial or professional environment related to the field of specialization chosen by the student at the College of Engineering, providing the student with practical on-job training experience. The student in this course is assigned to an operational and professional industrial organization for a period of 8 weeks or more. In other cases, a very intensive training period of less than 8 weeks can be accepted. During this industrial training, the student acquires the necessary soft skills along with valuable professional experience needed for the labour market after graduation.

Course Code	MEIE5291	Course Title	Project (1)
No. of Credit Hours	2	No. of Contact Hours:	-

A short description:

The course will focus on detailed design. Teach students how to integrate knowledge from the separate courses studied previously and concurrently. The students will tackle open-ended engineering problems whose solutions require a synthesis of design, judgment, technical skills, analysis, creativity, innovation and cost analysis. Afford students the opportunities to practice their skills in preparing and presenting reports. Teach students how to design and conduct experiments, as well as to analyze and interpret data.

Course Code	MEIE5275	Course Title	Automated Industrial Systems
No. of Credit Hours	3	No. of Contact Hours:	4

A short description: This course is used to introduce automation and computer-integrated concepts for industrial systems. This course emphasizes applying control and automation principles and applied these concepts into computerized numerical control machines (CNC), other automated equipment and industrial robotics.

Course Code	MEIE5244	Course Title	Supply Chain and Logistics Management
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course brings together the strategic, planning, and operational roles of the supply chain. The function of supply chain and logistics management is to design and manage the processes, assets, flows of material and information required to satisfy customers' demands. Globalization of economy and electronic commerce has heightened the strategic importance of supply chain and logistics management. This has created new opportunities for using supply chain strategy and planning of logistics need as a competitive tool. The course also introduces students to the supply chain and logistics issues during humanitarian and disaster relief operation.

Course Code	MEIE5225	Course Title	Smart Manufacturing
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Smart manufacturing is an emerging form of production integrating manufacturing assets of today and tomorrow with sensors, computing platforms, communication technology, control, simulation, data intensive modelling and predictive engineering. It utilizes the concepts of cyber-physical systems spearheaded by the internet of things, cloud computing, service-oriented computing, artificial intelligence and data science. The objective of the course is to provide a strong orientation to both the industry and the students on the new advancements in manufacturing in general and the relevant features of Smart Manufacturing.

Course Code	MEIE5288	Course Title	Innovation and Entrepreneurship
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Innovation at its simple definition is the process of turning ideas into reality and capturing value from them. In this course the student will learn how to innovate, create value which will eventually lead to start-up company. Finally, the student will learn how to manage resources i.e., money, people and equipment.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5292	Course Title	Project (2)
No. of Credit Hours	3	No. of Contact Hours:	-

A short description:

The course will focus on detailed design. Teach students how to integrate knowledge from the separate courses studied previously and concurrently. The students will tackle open-ended engineering problems whose solutions require a synthesis of design, judgment, technical skills, analysis, creativity, innovation and cost analysis. Afford students the opportunities to practice their skills in preparing and presenting reports. Teach students how to design and conduct experiments, as well as to analyze and interpret data.

Major Electives

Course Code	MEIE5201	Course Title	Occupational Safety Engineering
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Covers occupational safety and health aspects for supervisors in industrial organizations. Topics include hazard management, regulations, noise, fire protection, and more.

Course Code	MEIE5210	Course Title	Cooperative Training I
No. of Credit Hours	0	No. of Contact Hours:	-

A short description:

COOP-I program is designed to bridge the gap between academia and industry in Oman. The training framework of the program is designed in such a way to align the students' competencies with the industry' needs and also assure an efficient follow up and tracking of the students' progress. Such training program will allow students to apply and enhance their engineering knowledge and skills learned at the university in a real professional environment that requires technical expertise, teamwork, interpersonal skills, leadership, creativity, work ethics, organizational, cultural and professional networking skills. Furthermore, the training program will increase students' self-confidence and provide them with additional skills required by industry in real work environments. This will complement the knowledge acquired in the classroom through "Learning by Doing".

Course Code	MEIE5211	Course Title	Cooperative Training II
No. of Credit Hours	6	No. of Contact Hours:	-

A short description: COOP-II program is designed to bridge the gap between academia and industry in Oman. The training framework of the program is designed in such a way to align the students' competencies with the industry' needs and also assure an efficient follow up and tracking of the students' progress. Such training program will allow students to apply and enhance their engineering knowledge and skills learned at the university in a real professional environment that requires technical expertise, teamwork, interpersonal skills, leadership, creativity, work ethics, organizational, cultural and professional networking skills. Furthermore, the training program will increase students' self-confidence and provide them with additional skills required by industry in real work environments. This will complement the knowledge acquired in the classroom through "Learning by Doing".

Course Code	MEIE5222	Course Title	Introduction to Healthcare Management
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course places emphasis, but not limited to, on the application of quantitative techniques to problem solving and decision making related to the management of health care providers such as hospitals, physician group practices, health maintenance organizations, and nursing homes Topics include management fundamentals, decision-making resource planning and scheduling, productivity measurement and role of information technology in healthcare system.

Course Code	MEIE5224	Course Title	Six Sigma Methodology
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The students will learn the Six Sigma methodology through the DMIAC (Define-Measure-Analyze-Improve-Control). The aim is to meet or exceed customer expectations by improving process quality. The Six Sigma methodology objective is to eliminate or manage the source of variations.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5251	Course Title	Agent-Based Modelling
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The advent of widespread fast computing has enabled us to work on more complex adaptive systems. Systems in which a perfect understanding of the individual parts does not automatically convey a perfect understanding of the whole system's behaviours. This hands-on course gives students a comprehensive description of the core concepts, methods, and applications of agent-based modelling (ABM) paradigm. Teaching them the skills to design, run, and analyze agent-based models. The course requires no previous modelling experience and will go through numerous practical examples which will provide students with the necessary skills to implement their own agent-based models.

Course Code	MEIE5263	Course Title	Design for Manufacturing
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The course covers the product design and manufacturing; design for assembly, processes and design; economic considerations and design considerations for machining, casting, forging forming and other processes of materials transformation; designing with plastics; actual product design projects and case studies from industry and business. Main Topics: Introduction to design for Manufacturing, Design for low cost and assembly, Process Planning CAD/CAM, Physics for other selected manufacturing processes, cutting tools and fixtures, Joining and assembly, Manufacturing cost, Quality control.

Course Code	MEIE5287	Course Title	Project Management
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This is an intermediate course in the area of project management, with an emphasis on short to intermediate term decision making and quantitative techniques. The course introduces the key activities for project success and helps to identify and understand the importance of key people in every project. Project planning, budgeting and cost estimation for a project are covered in detail. Furthermore, the know-how required to achieve timely completion of projects through proper scheduling is addressed. In addition, the course covers the important aspect of identifying, assessing, and controlling risk throughout the execution of projects.

Course Code	MEIE5271	Course Title	Decision Analysis Models and Applications
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course provides an overview of modelling techniques and methods used in decision analysis, including multi-attribute utility models, decision trees, and Bayesian models. Psychological components of decision making are discussed. Elicitation techniques for model building are emphasized. Practical applications through real-world model building are described and conducted, including business management, supply chain and logistics, transportation, health care, and homeland security. Each group, which consists of 1-3 students, will work on a project throughout the semester, including oral presentations and written reports.

Course Code	MEIE5285	Course Title	Technology Transfer
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Technology has become imperative for individuals, firms, and countries to survive global competition and satisfy expectations of stakeholders. Nowadays there is an increasing trend of sourcing novel technologies from other firms and universities. This course will look at the overall technology commercialization process. The emphasis will be on the processes by which intellectual property is protected, valued and transferred from one organization to another. It also addresses the strategic decision of identifying target markets, economic valuation of technology and the assessment of commercialization strategies.

Course Code	MEIE5290	Course Title	Data Mining
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course on data mining will cover methodology, major software tools and applications in this field. By introducing principal ideas in statistical learning, the course will help students to understand conceptual underpinnings of methods in data mining. A considerable amount of effort will also be put into computational aspects of algorithm implementation. To make an algorithm efficient for handling very large-scale data sets, issues such as algorithm scalability need to be carefully analyzed. Data mining and learning techniques developed in fields other than statistics, e.g., machine learning and signal processing, will also be introduced.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE5233	Course Title	Maintenance and Reliability Engineering
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Fundamental concepts of reliability; analysis of failure data; reliability models, reliability of systems; reliability testing; maintainability and maintenance models; computer applications.

Course Code	MEIE5264	Course Title	CAD/CAM
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course is designed to address geometric modelling, using selected CAD/CAM packages to graphically model parts in 2D, 3D wire-frame and solid; graphic display manipulation; geometrical analysis; graphic and data files management; exchange, and conversion of graphic files to standardized formats such as DXF, IGES. Generating G-codes, post processing G-codes into formats interpretable by given CNC controllers. Editing G-Codes with verification of validity of tool paths in 3D and solid graphical simulation. Disciplines of the numerical control hardware. Rapid prototyping, automation in CAM, integration of machine vision with CAM and applications in manufacturing and data communications.

Course Code	MEIE5265	Course Title	Computer Integrated Manufacturing
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course is designed to address the computerized integration of product design, planning, production, distribution, and management. Intended to provide knowledge for computer integrated manufacturing (CIM) system, including how to apply robot and manufacturing automation. Emphasize methodology and goal for on-line computer control that link all functions in manufacturing plant.

Course Code	MEIE5280	Course Title	Sustainable Manufacturing Systems
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Sustainability/sustainable development has become imperative for manufacturing systems, firms, enterprises, industrial estates and/or sectors and countries to survive global competition and satisfy expectations of stakeholders. Nowadays, there is an urgent need to adopt sustainability/sustainable development concepts, analyses and assessments to support manufacturing systems. This course will look at the overall sustainability/sustainable development issues including economic, social and environmental perspectives. The emphasis will be on every process and issue identifying the existing value and moving towards target value and the assessment of sustainability and sustainable development index for each aspect, pillar and manufacturing enterprises, industrial estates and/or sectors and countries.

Course Code	MEIE5297	Course Title	Special Topics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course will teach students the state-of-the-art topics in industrial engineering. The course will focus on recent advances and their applications to solve real world engineering problems in the field of industrial engineering. Emphasis will be given to use experimental and/or computational tools to find viable engineering solutions. A term project will allow the students, at the same time, to apply the knowledge gained in class.

Course Code	MEIE4141	Course Title	Fluid Mechanics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course covers the fundamental principles of fluid mechanics: fluid properties, fluid statics and kinematics, governing laws related to fluid flow (continuity, momentum and energy equations) and their applications, dimensional analysis, concept of laminar and turbulent flows, flow in pipe, drag and lift forces for simple bodies, introduction to compressible flows.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE4183	Course Title	Numerical Analysis
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course covers the basics of numerical methods for the solution of applied problems in engineering. The course emphasizes an understanding of mathematics underlying the various numerical methods that have been developed for solving linear and nonlinear problems and for approximating functions using polynomial approximations, splines and curve fitting. The course includes a treatment of numerical differentiation, numerical integration and an introduction to the computational solution of ordinary differential equations.

Course Code	MEIE5168	Course Title	Introduction to Polymers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description: Introduction to Polymers is a senior-level course for mechanical engineering students which covers the basics of polymeric materials for engineering design. The course starts by explaining the molecular structure of polymers and its role in the broad classification of polymers to thermoplastics and thermosets. Main topics covered are; the fundamental chemistry of polymerization, physical and mechanical properties of polymers, thermal behaviour of polymers, polymer composites, experimental testing of basic polymer properties, manufacturing techniques of polymers (injection molding, extrusion, compression molding, 3D printing), comparison of polymers to metals and ceramics, viscoelastic nature of polymers, design calculations of polymers in design (static and dynamic loading).

Course Code	MEIE5183	Course Title	Emerging Technologies in ME
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Emerging technologies are characterized by radical novelty, relatively fast growth, prominent impact, and uncertainty. This course will explore current breakthrough technologies that have emerged over the past few years and its impact on industry, business, and society. Big data, machine learning, artificial intelligence, internet of things, robotics, virtual reality, etc. are a few topics that will be discussed with applications in Mechanical Engineering discipline.

College Electives

Course Code	COMP2002	Course Title	Introduction to Computer Program for Engineer
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course is intended to introduce the engineering students to software development using a high-level programming language. Course contents include: problem solving methodology, program structure, language syntax, variables, data types, control flow, functions, data files, arrays, and variable scope.

Course Code	ENGR2217	Course Title	Programming for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course is intended to develop students' computer skills in writing and implementing computer programs applied to engineering problem solving using high level programming language such as C or C++. The course contents target the following themes: computing basics, algorithmic thinking, program structures and applied programming for engineering problem solving.

Course Code	MATH2108	Course Title:	Calculus II
No. of Credit hours	3	No. of Contact hours:	4

A short description:

This is the second course in a series of three Calculus courses. The course builds on the topics taught in Calculus 1, and deals primarily with applications of integration such as calculating volumes, length of curves and surface areas, the techniques of integration of various functions, and proper and improper integrals. It also deals with sequences, series and their convergence, power series and their convergence as well as differentiating and integrating power series. The course ends with the introduction of the polar coordinate system, polar curves and some basic polar calculus. Relevant theorems with their proofs will be emphasized.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE3107	Course Title	Engineering Drawing and Graphics
No. of credit hours	3	No. of Contact hours:	4

A short description:

Engineering drawing is the technical language of engineers and technicians in academic or industrial settings. This course provides introduction to the theory and standards of technical drawings, computer aided solid modelling. The course covers theory of technical drawing and modelling of two and three-dimensional objects. Topics covering theory are: conventions and standards of engineering drawing, sketching techniques, theory of projections, rules of dimensioning, auxiliary views, isometric views, pictorial views and tolerancing. The course extensively covers two and three-dimensional modelling using latest CAD programs. Student will create solid models of parts and assembling them through several tutorial sessions. Modifying geometry, dimensioning, storing and retrieving predefined shapes, generating multiviews, designing and manipulating drawing sheets are also taught.

Course Code	MEIE3275	Course Title	Mechatronics Systems
No. of credit hours	3	No. of Contact hours:	5

A short description:

The aim of this course is to provide the student with a foundation in dynamics, instrumentation, and control systems by doing several projects. First, an understanding of control system components, such as sensors and associated instrumentation systems, actuators, and power amplifiers, will be developed while working on a number of projects. The course will provide students with hands-on working knowledge of real-time programming, computer/microcontroller/sensor interfacing, actuators' control etc.



• MSc. in Mechanical Engineering

Course Description

Course Code	ENGR6913	Course Title	Advanced Engineering Mathematics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

At the end of this course the student will be able to classify the different types of differential and partial differential equations used in the field of Engineering. They will be able to solve a class of ordinary differential equations, which are related to the field of Engineering. The student will be able to compare and try different methods of solving partial differential equations using special functions and series method techniques.

Course Code	ENGR6910	Course Title	Advanced Engineering Statistics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Statistics is the activity of inferring results about a population given a sample. Engineers typically collect all sorts of data such as manufacturing data, maintenance, material testing systems...etc. Ultimately, the reason for collecting data is to make a decision. Any decision would rely on helpful information using statistical analysis. The conclusions that one may draw from using statistical analysis are only as good as the underlying model that is used to describe the real-world phenomenon. This course is intended to help you perform statistical analysis by giving guideline on data collection, representation, and interpretation. Moreover, the course will cover topic in design of experiments, regression, and correlation which are of interest for senior students.

To introduce to students the statistical concepts, theory and methods used in experimentation and testing of processes and systems to minimize the effects of external and internal sources of variability and thereby optimizing process/system performance. Special attention will be given to the development and design processes in engineering to ensure the selection of the best possible alternative design. Description: Data description and management; the normal distribution; random samples and sampling distributions; points and confidence interval estimation; test of hypothesis; single and multiple factors experimental design and analysis; simple and multiple regression analysis and correlation; analysis of variance; non-parametric statistics; and computer applications in statistical analysis (use of statistical software package).

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE6004	Course Title	Advanced Numerical Methods
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Advanced Numerical Methods is a continuation of the undergraduate level course Numerical Methods. The course starts by reviewing initial and boundary value ordinary differential equations. It introduces numerical solutions to partial differential equations using finite difference methods. Solving systems of nonlinear equations is developed as an introductory topic to optimization. The course covers unconstrained optimization and constrained optimization with equality and inequality constraints. A brief introduction to heuristic optimization is also covered.

Course Code	MEIE6111	Course Title	Advanced Engineering Measurement Systems
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

The course is to provide students with advanced knowledge of measurement systems. The topics include: Review of measurement systems; static and dynamic characteristics of signals; measurement system behaviour; uncertainty analysis. Analog electrical devices and measurements. Sampling and data acquisition. Measurement of motion, force, torque, pressure, flow, temperature and humidity. Signal conditioning and transmission. Computer aided data acquisition and analysis. Case studies through students' projects on design of experiment setup and analysis.

Course Code	MEIE6001	Course Title	Project Engineering and Management
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

This is an intermediate course in the area of project management, with an emphasis on short to intermediate term decision making and quantitative techniques. The course introduces the key activities for project success and helps to identify and understand the importance of key people in every project. Project planning, budgeting and cost estimation for a project are covered in detail. Furthermore, the knowhow required to achieve timely completion of projects through proper scheduling is addressed. In addition, the course covers the important aspect of identifying, assessing, and controlling risk throughout the execution of projects.

Course Code	MEIE6099	Course Title	Special Topics In ME
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture, 1 Seminar)

A short description:

This course introduces students to state-of-the-art and emerging technologies in mechanical engineering, emphasizing advanced knowledge and specialized expertise. Students will explore recent advances and their applications in addressing complex, real-world engineering problems within the field of mechanical engineering. The course fosters critical thinking, problem-solving, and the integration of advanced research to generate innovative solutions. Through a term project, students will apply and demonstrate their mastery of theoretical and practical knowledge, showcasing their capacity for autonomous learning and professional-level performance in mechanical engineering contexts.

Course Code	MEIE6212	Course Title	Directed Studies
No. of Credit Hours	3	No. of Contact Hours:	3 (Project)

A short description:

The course aims to provide students an opportunity to undertake supervised elements of research that are not offered elsewhere across the curriculum. The students are expected to select a topic(s) in the broader periphery of the ME program for independent research yet supervisor-directed research.

Course Code	MEIE6112	Course Title	Design and Analysis of Experiments
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

The course is intended to develop the skills necessary to efficiently and effectively design and analyze experiments. The course topics include experiment planning, designs, and statistical analysis of the results. Applications in most areas of engineering including mechanical, industrial, chemical, petroleum, and civil will be presented and discussed. Students will be able to develop successful experiments that can lead to enhanced process performance, improved product quality, and reduced development lead time.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE6011	Course Title	Advanced Heat Transfer
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

This course aims to equip students with the knowledge and skills necessary to address complex heat transfer challenges in diverse engineering and scientific contexts. The course covers a range of topics, providing a comprehensive understanding of advanced heat transfer principles and applications. Students will engage in critical analysis, problem-solving, and hands-on applications to deepen their understanding of advanced heat transfer principles.

Course Code	MEIE6020	Course Title	Computational Fluid Dynamics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Introduction to fluid flow and heat transfer, emphasis on introductory concepts in computational fluid mechanics, introductory concepts in finite difference and finite volume methods for parabolic, elliptic and hyperbolic PDEs. Governing equations for fluid flow and heat transfer, discretization schemes, numerical methods, turbulence modelling, grid independence and quality check, boundary conditions and numerical errors will be covered. Students will have hands on experience in using computational fluid dynamics solver applied to engineering problems.

Course Code	MEIE6014	Course Title	Desalination and Water Treatment Technology
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture, 1 Seminar)

A short description:

This course covers: Water resources, Chemistry of saline water, Fundamentals of Thermal and Membrane Desalination. Modelling of single and multistage desalination processes. Design and operation of Reverse Osmosis. Membrane fouling and scale formation. Pre and post treatment operations. Economic consideration of various desalination processes.

Course Code	MEIE6016	Course Title	Advanced Thermodynamics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

This course covers advanced topics in classical thermodynamics. It will start by reviewing basic concepts, laws, and thermodynamic quantities. In addition, selected advanced topics such as Thermodynamics relations, Mixtures and solutions, and Chemical Reactions.

Course Code	MEIE6017	Course Title	Advanced Fluid Mechanics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Objective: The objectives are to develop in each student a good overview of the viscous flow phenomena and major analytical tools that can be used to solve these flows. At the conclusion of this course the students should be prepared to apply the principles and methods in related areas of study such as convective heat transfer and continue study of fluid mechanics in areas such as turbulence. The students should be able to read and critically evaluate the literature and make original contributions. Main Topics: Topics includes preliminary concepts, fundamental equations of compressible viscous flow, solutions of Newtonian flow equations, laminar boundary layers, incompressible boundary layer mean flow, integral analysis of boundary layers with pressure gradient, boundary layer stability and transition.

Course Code	MEIE6142	Course Title	Advanced Solar Thermal Processes
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

In this course, design and modelling of solar thermal systems using the fundamentals and principles of solar thermal processes are covered. Solar radiation calculations and the modelling of solar thermal processes using flat-plate collectors and concentrating collectors will be the main principles for introducing the student to the design and modelling part.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE6101	Course Title	Advanced Solid Mechanics
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture, 1 Seminar)

A short description:

Strain energy methods; thick/thin-walled pressure vessels; shrink-fit assemblies; rotating discs; thermal stresses; shells and plates; beams on elastic foundation.

Course Code	MEIE6102	Course Title	Rotor Dynamics
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture, 1 Seminar)

A short description:

Characteristics of rotor elements, bearings, seals; finite element formulations of rotor elements, model of rotor-bearing system; model reduction; critical speeds; Campbell diagram; stability of rotors; transient motions- start-up and coast down; industrial applications and case studies.

Course Code	MEIE6104	Course Title	Advanced Process Control Systems
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture, 1 Seminar)

A short description:

The course emphasizes the use of Computer aided Control System Design (CACSD) packages, real-time computing and digital signal process. Main Topics: Linear quadratic optimal control; recursive least-squares system identification, self-tuning control, optimal state estimation- Kalman filters; Robust control; Fuzzy logic control, neural network; Implementation of controllers; applications of Digital Signal Processors (DSPs) and PCs, case studies.

Course Code	MEIE6108	Course Title	Advanced Vibrations
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Review of elementary vibration topics for lumped systems. Boundary-value problem formulation for distributed-parameter systems like bars, shafts, beams, membranes and plates; solution for natural frequencies and modes; system response in time and frequency domains. Approximate methods- assumed modes method, methods of weighted residuals, sub structuring and component mode analysis. Finite Element Method for vibration analysis. Software implementation. Case studies.

Course Code	MEIE6105	Course Title	Advanced Engineering Materials
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture, 1 Seminar)

A short description:

This course on Advanced Materials Processing and Failure Analysis offers a comprehensive exploration of the relationship between material processing, microstructure, and mechanical properties across various engineering materials. Students will delve into metallic materials, polymers, and composites, examining their unique behaviours and applications in engineering contexts. Key topics include materials processing techniques, the effects of heat treatment on metallic materials, and an in-depth analysis of mechanical behaviours and failure modes for both metallic and polymeric composites. Through case studies and hands-on projects, students will critically evaluate material selection and processing strategies while identifying the causes of failure in engineering applications. By integrating theoretical knowledge with practical insights, this course prepares students to develop innovative solutions for material challenges, equipping them to lead future engineering projects with a strong foundation in advanced materials science.

Course Code	MEIE6118	Course Title	Mechanical Behaviours of Engineering Materials
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

The course covers the mechanical behaviour of engineering metallic based materials under different kinds of loadings and processing. The processing-microstructure-properties-performance relationships are discussed. Microstructure and crystallographic texture measurements and analysis are covered and explained. Mechanical behaviour, deformation and fracture of materials under loading and during processing are discussed, together with their relationship to microstructure and texture. Texture measurements techniques like X-ray diffraction and electron back-scattered diffraction (EBSD/SEM) and texture analysis and presentation are included. Several deformation and annealing textures are presented.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE6116	Course Title	Engineering Fracture Mechanics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

This course provides a basic understanding of Fracture Mechanics, the study of propagation of existing cracks leading to failure. It is aimed at a basic understanding of the causes of fatigue and fracture failure, design against fracture, and methods of failure prediction. Main Topics: Some of the topics that may be covered are: Introduction and historical background of fracture mechanics; Fracture mechanics approach to design; Linear elastic fracture mechanics (LEFM); Elastic-plastic fracture mechanics; Introduction to fatigue crack growth; LEFM Applications; Elastic-plastic applications; Fracture mechanisms in metals and alloys; Fracture toughness testing.

Course Code	MEIE7002	Course Title	Master Thesis
No. of Credit Hours	6	No. of Contact Hours:	1

A short description:

This is Master Thesis course. Master students with thesis option have to take this course after completing at least 12 credit hours of course work. The selection of the thesis topic is the responsibility of the student after consulting with the possible advisor. A synopsis of the work has to be submitted by the student at the beginning of the thesis work. Students are also required to submit progress report at the end of each semester of thesis. They are also required to present two seminars before the defence of the thesis.



- **MSc. in Industrial Engineering**

Course Description

Course Code	ENGR6913 OR ENGR6910	Course Title	Advanced Engineering Mathematics, OR Advanced Engineering Statistics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

At the end of this course the student will be able to classify the different types of differential and partial differential equations used in the field of Engineering. They will be able to solve (analytically) a class of ordinary differential equations which are related to the field of dynamics, vibration and other mechanics problems. The student will be able to compare and try different methods of solving partial differential equations using special functions and series method techniques. Also, this course aims that the student will be able to describe heat, fluid and solid mechanics problems in terms of vectors, matrices and tensor notations. Main topics: Mathematical preliminaries. Differential equations; linear; nonlinear; homogenous and non-homogenous. Solution methods such as Laplace transforms for linear differential equations and phase plane methods for nonlinear differential equations. Linear algebra and vector calculus. Partial differential equations (elliptic, parabolic and hyperbolic) and their methods of solution such as separation of variables, special functions and series solutions.

Course Code	ENGR6911	Course Title	Engineering Management
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture/ 1 Seminar)

A short description:

This Course focuses on introducing a variety of quantitative methodologies, tools and techniques to facilitate the optimum utilization of manpower, materials, machines, money and other resources. Description: Every industry or governmental organization faces the common problems of "operating", such as forecasting demand, managing, scheduling work, and controlling quality levels. In addition, the pressures of international competition have made it imperative that today's managers solve these problems creatively and efficiently. This course, hence, aims to provide the master candidate with an understanding of the engineering and operation management tools and techniques that enables them to contribute towards improving operating decisions.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	ENGR 6912	Course Title	Engineering Economic Decision Analysis
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Comprehensive treatment of engineering economic decision making including the concepts of time value of money; effects of inflation and taxation, sensitivity analysis, decisions under risk and uncertainty, decision tree and expected value, capital budgeting for graduate engineering students.

Course Code	MEIE6001	Course Title	Project Engineering and Management
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Project management philosophy and concepts; project structures; management functions; ethical issues in engineering management; learning curves; project planning and control; risk management; computer applications.

Course Code	MEIE6002	Course Title	Quality, Reliability and Maintainability Engineering
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture/ 1 Seminar)

A short description:

Examination of various quality, reliability and capital equipment maintainability concepts; statistical theory of reliability and maintainability within the quality assurance environment. Total Quality Management and Taguchi methods. Use of failure mode analysis techniques; Test plans and accelerated testing; design methods for increasing system reliability and maintainability in a high-quality production environment. Cost and benefit considerations in engineered systems. Case studies and team projects.

Course Code	MEIE6201	Course Title	Productivity Analysis and Management
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture/ 1 Seminar)

A short description:

Definition and measurement of productivity in any production, manufacturing or service delivery system. Determining the customers and their expectations from the system and the analysis of how well the system is responding to customer expectations. Productivity and efficiency relationships in an organization and engineering management policies to optimize the productivity of a system producing goods or services in the industrial or government sectors. Student projects and case studies.

Course Code	MEIE6202	Course Title	Occupational Ergonomics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Objective: To develop in student skills in ergonomic principles, and procedures concerned with employee performance, health and safety. Course Content: Fundamentals of work physiology, biomechanics, and anthropometry; Musculoskeletal disorders, Manual materials handling; CTD; Workplace design, computer workstation, assembly workstation; Shift work; Work environment; Occupational health and safety; Ergonomics programs; participatory ergonomics and implementation.

Course Code	MEIE6206	Course Title	Applied Optimisation
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Objective: This course will focus on formulating optimization problems and solving them. Mathematical basics behind the simplex method, branch & bound and nonlinear programming are presented. Applications related to subjects such as scheduling, project management, reliability and timetabling are discussed. Available software such as Excel, Excel, LINGO and MATLAB is used to solve the formulated problems. Main Topics: Optimization models related to linear programming, nonlinear programming, integer programming stochastic programming and dynamic programming. Meta-heuristic and heuristic optimization techniques such as genetic algorithm AG, Tabu search TS, simulated annealing SA, ant systems AS, and adaptive sampling techniques. Problems related to network flow, scheduling, timetabling, reliability, data mining, logistics and other problems that are interesting to the students.

Course Code	MEIE6208	Course Title	Reliability Engineering
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Fundamental concepts of reliability; reliability functions, reliability distributions; analysis of failure data; reliability of systems; probabilistic risk assessment; design for reliability; reliability testing; maintainability and availability; computer applications.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE6211	Course Title	Special Topics in IE
No. of Credit Hours	3	No. of Contact Hours:	3 (2 Lecture/ 1 Seminar)

A short description:

Objectives: To provide a forum of professional development of the students preparing to enter the practice of Mechanical Engineering. Description: Advanced courses on special topics of current interest in Mechanical Engineering, given as the need arises.

Course Code	MEIE6212	Course Title	Directed Studies
No. of Credit Hours	3	No. of Contact Hours:	3 (Project)

A short description:

Objectives: To review and discuss real world case studies from industry, government and service organizations illustrating the theory and applications of Industrial engineering techniques and methods. Description: Review of several real-world case studies from industry, government and service sectors will be presented and discussed. Students will be assigned case studies to investigate and write comprehensive reports with analyses and critiques of the case as it happened and how they would have handled it had they been managing the situation.

Course Code	MEIE6216	Course Title	Logistics and Supply Chain Engineering
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Modern supply chains are based on networks with a number of actors from manufacturer to distributor to retailer. This course covers the use of modelling for coordinating production, inventory, distribution, and transportation across a supply chain network.

Course Code	MEIE6218	Course Title	Simulation Modelling and Analysis
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Introduction to discrete event digital simulation, including development of simulation models, random number and random variable generation, model validation and testing, analysis of model output, and an overview of simulation languages. Emphasizes the use of simulation modelling in decision-making through a series of projects involving decision problems. Knowledge of programming required.

Course Code	MEIE6220	Course Title	Sustainable Industrial Systems
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Sustainability/sustainable development has become imperative for manufacturing systems, firms, enterprises, industrial estates and/or sectors and countries to survive global competition and satisfy expectations of stakeholder. Nowadays, there is an urgent to adopt sustainability/sustainable development concepts, analyses and assessments to support manufacturing systems. This course will look at the overall sustainability/sustainable development issues including economic, social and environmental perspectives. The emphasis will be on every process and issue identifying the existing value and moving towards target value and the assessment of sustainability and sustainable development index for each aspect, pillar and manufacturing enterprises, industrial estates and/or sectors and countries.

Course Code	MEIE6222	Course Title	Healthcare Management
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

This course places emphasis, but not limited to, on the application of quantitative techniques to problem solving and decision making related to the management of health care providers such as hospitals, physician group practices, health maintenance organizations, and nursing homes. Topics include management fundamentals, decision-making, resource planning and scheduling, productivity measurement and role of information technology in healthcare system.

Course Code	MEIE6224	Course Title	Lean Six Sigma
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Lean Six Sigma focus on continuous improvement in critical to quality aspect. The student will learn various wastes involved in any process and how to eliminate or reduce them through lean concepts. Then will learn the DMAIC framework of six sigma and how to minimize variation to strive for excellence in delivering and exceeding customer expectation.

ACADEMIC DEPARTMENTS

MECHANICAL AND INDUSTRIAL ENGINEERING

Course Code	MEIE7002	Course Title	Master Thesis
No. of Credit Hours	6	No. of Contact Hours:	1

A short description:

This is Master Thesis course. Master students with thesis option have to take this course after completing at least 12 credit hours of course work. The selection of the thesis topic is the responsibility of the student after consulting with the possible advisor. A synopsis of the work has to be submitted by the student at the beginning of the thesis work. Students are also required to submit progress report at the end of each semester of thesis. They are also required to present two seminars before the defence of the thesis.

- PhD in Mechanical Engineering**

Course Description

Course Code	MEIE8001	Course Title	PhD Thesis
No. of Credit Hours	0	No. of Contact Hours:	3 (Thesis)

A short description:

To conduct original research work in mechanical/industrial engineering discipline (analytical/simulation/experimental or a combination) leading to an extension to the existing body of knowledge in the field that is of significance to academia and industry. The research is conducted to fulfil the requirements of a doctoral thesis.

- PhD in Industrial Engineering**

Course Description

Course Code	MEIE8001	Course Title	PhD Thesis
No. of Credit Hours	0	No. of Contact Hours:	3 (Thesis)

A short description:

To conduct original research work in mechanical/industrial engineering discipline (analytical/simulation/experimental or a combination) leading to an extension to the existing body of knowledge in the field that is of significance to academia and industry. The research is conducted to fulfil the requirements of a doctoral thesis.

4.3.4 Labs and Workshops

The Department has well-equipped laboratories for both Mechanical and Industrial Engineering programs. The laboratories are well equipped with modern devices and setups, which are capable of conducting experimental work for both teaching and research purposes. The department has two mechanical workshops and one carpentry workshop equipped with a range of equipment and three Computer labs.

The Department has the following laboratories/facilities:

1. Properties of Materials Laboratory
2. Steam and Heat Engines (Thermodynamics) Laboratory
3. Refrigeration and Air-Conditioning Laboratory
4. Solid Mechanics Laboratory
5. Fluid Mechanics Laboratory
6. Automatic Control Laboratory
7. Mechanical Systems Laboratory
8. Metrology Laboratory
9. Computer Integrated Manufacturing (CIM) Laboratory
10. Ergonomics Laboratory
11. Industrial Systems Laboratory
12. MIE Research Laboratory
13. Engineering Research Laboratory (shared)
14. Central Machine Workshop
15. Engineering (Teaching) Workshop
16. Carpentry Workshop

4.4 Department of Petroleum and Chemical Engineering (PCE)

4.4.1 Department Overview

The Department of Petroleum and Chemical Engineering (PCE) was established in 1986 under the name of the Department of Petroleum and Mining Engineering. As the nation's energy and industrial sectors developed, the Department evolved to meet the growing demands of the job market. In 2003, two independent undergraduate programs were introduced: Petroleum and Natural Gas Engineering (PNGE) and Chemical and Process Engineering (CHPE), both of which are accredited by the Accreditation Board for Engineering and Technology (ABET).

The Department is committed to delivering high-quality education that equips students with a solid foundation in engineering principles, analytical thinking, and practical problem-solving skills. The curriculum is carefully structured to develop competencies relevant to the petroleum and chemical sectors while also integrating ethical, social, and environmental perspectives. The Department offers a comprehensive range of academic programs, including undergraduate, MSc, and PhD degrees in both Petroleum Engineering and Chemical and Process Engineering.

Research plays a central role in the Department's mission. Faculty members and students are actively engaged in research areas such as enhanced oil recovery, reservoir simulation, green hydrogen production, carbon capture and storage (CCUS), and catalysis. The Department continues to introduce postgraduate courses that reflect developments in Industry 4.0 and energy transition technologies, ensuring students remain current with global advancements. Modern laboratories and experimental facilities support these activities and serve both educational and research objectives.

Through its academic offerings and research contributions, the Department aims to prepare graduates who are capable of leading and innovating in the energy and chemical industries. The Department maintains strong ties with the public and private sectors, and many of its graduates now hold leadership positions in Oman and abroad. With a forward-looking approach and ongoing curriculum development, PCE remains committed to shaping future engineers equipped to meet tomorrow's challenges.

Vision of the Department

To be a global leader in petroleum and chemical engineering education and research, integrating traditional energy with sustainable practices and digital innovations to advance the future of energy and environmental stewardship.

Mission of the Department

To deliver transformative education in petroleum and chemical engineering, foster cutting-edge research in sustainable energy technologies, and engage with industry and communities to drive sustainable development and economic growth through digital innovation.

1. Prepare students to be innovative, ethical engineers capable of addressing sustainability and energy transition challenges, equipped with digital competencies and industry-relevant skills for the evolving energy sector.
2. Advance sustainable energy technologies—including renewable energy, storage, carbon solutions, and digital innovations like AI and automation—contributing to knowledge and technological development.
3. Collaborate with industry, government, and communities to implement sustainable energy solutions that enhance quality of life, promote economic growth, and provide hands-on industry experience through strategic partnerships.
4. Cultivate a collaborative and inclusive environment that supports interdisciplinary research, lifelong learning, and global engagement while fostering digital literacy and practical industry applications.

4.4.2 Faculty and Staff



Dr. Rashid S. Al-Hajri

Associate Professor and Head of Department

Research Interests: Green Hydrogen Production, Hydrogen and CO₂ Management, Advanced Wastewater Treatment, Petrochemical Intermediates Production

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING



Dr. Hamoud K. Al-Hadrami

Associate Professor, Assistant HoD

Research Interests: Drilling Engineering, Formation Evaluation / Well logging, Formation Damage / Core flooding, Wellbore-Cement stability, Researcher/consultant for the Oil & Gas industry



Prof. Rashid Al-Maamari

Professor

Research Interests: Chemical Enhanced Oil Recovery (Alkaline, Surfactant, and Polymer), Wettability, Smart Water Flooding, Reservoir Engineering



Prof. Farouq Sabri Mjalli

Professor

Research Interests: Ionic Liquids applications in chemical processing., Synthesis of CNT and their applications, Development in redox flow batteries, Carbon dioxide capture and utilization, Application of advanced model-based process control, Water treatment technology



Prof. Gholamreza Vakili-Nejad

Professor

Research Interests: CCU, Hydrogen Storage, Energy & Exergy, Nanofluids



Prof. Ala'a Al-Muhtaseb

Professor

Research Interests: Waste valorisation, Waste to energy, Sustainable Fuel, Life Cycle Assessment (LCA), Biohydrogen, Wastewater Treatment, Catalysis



Prof. Mohammed Al-Abri

Professor

Research Interests: Desalination, Water Treatment, Nanotechnology, Membrane Technology, Water Quality



Dr. Jamil Naser

Associate Professor

Research Interests: CO₂ Capture, Deep Eutectic Solvents., Environmentally friendly energy efficient solvents, Solar Desalination, Liquid Phase Sintering in Microgravity



Dr. Ashish M Gujarathi

Associate Professor

Research Interests: Process Systems Engineering & Process Optimization, Green Hydrogen, Carbon Capture, Polymers, etc. , Complex real-world Chemical and Oil & Gas Processes, Retrofitting; Sustainable Engineering; Machine Learning



Dr. Ghulam Murshid

Associate Professor

Research Interests: Advanced solvent systems for low-energy CO₂ separation, Equilibrium and thermodynamic analysis of CO₂ capture systems, Solid Waste Management



Dr. Khashayar Nasrifar

Associate Professor

Research Interests: Thermodynamics of Phase Equilibria, Cryogenics, Gas Hydrate Phenomena, SAFT modelling, Equations of State

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING



Dr. Tarek Ganat

Associate Professor

Research Interests: Enhanced Oil Recovery (EOR), Reservoir characterization and Simulation & Modeling, Pressure Transient Analysis, Nanotechnology in Petroleum Applications, Machine Learning in Reservoir Engineering, Formation Damage, Field Development plan and Optimization



Dr. Belal Abu Tarboush

Associate Professor

Research Interests: Energy, Membranes, and Adsorbents



Dr. Emre Artun

Associate Professor

Research Interests: Reservoir Management, Data Analytics and Machine Learning Applications, Subsurface Gas Storage, Geothermal Energy



Dr. Alireza Hasan Kazemi

Assistant Professor

Research Interests: Sustainable energy storage and production, Fluid flow in porous media, Reservoir modelling and simulation, Application of AI in petroleum engineering, Carbon storage



Dr. Muhammad Abdul Qyyum

Assistant Professor

Research Interests: Enabling and Strategic Clean Energy Technologies, Hydrogen Transportation, LNG Value Chain Enhancement and Decarbonization, CCUS Value Chain, Energy-efficient Decarbonization



Dr. Faras Al Balushi

Assistant Professor

Research Interest: Reservoir geomechanics, Geothermal energy, Digital rock modelling, Enhanced oil recovery



Dr. Ali Taqi

Assistant Professor

Research Interest: Carbon capture, Green Hydrogen & Water Desalination, Microwave & RF technologies for enhanced Bio-Refineries & Telecommunications, Interferometry-based imaging for Radio Astronomy & Medical applications, Multipurpose Scientific Computing



Mrs. Suaad Al-Zakwani

Lecturer (on-study leave)

Research Interest: Chemical Engineering



Eng. Mazin Al-Mahrezi

Technician Superintendent



Eng. Nasser Mohammed Al-Mandhari

Senior Engineer B

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING



Mr. Sabri Salam Al-Khusaibi
Chief Technician C



Mr. Hamdan Bin Saif Al-Amri
Lab Supervisor B



Eng. Adel Awadh Al-Rubkhi
Engineer B



Engr. Mohammed Al Muqaimi
Engineer B



Mrs. Moza Al Barwani
Coordination, Follow-up & Archive specialist

4.4.3 Academic Programmes

- **BSc. in Petroleum and Natural Gas Engineering**

Course Description

Course Code:	PNGE2102	Course Title:	Basic Mechanics
No. of credit hours:	3	No. of contact hours:	4

A short description:

PNGE students are introduced to the basic mechanics of particles and rigid bodies. The course has two parts. Statics part covers: Concepts of force, Moment, Resultant, Free body diagram; Equilibrium state and friction. Dynamics part covers: Concepts of velocity; Acceleration; Inertia forces; Centrifugal forces; Particle and rigid body dynamics.

Course Code:	PNGE3111	Course Title:	Chemistry for Petroleum Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course covers: The origin of petroleum; Introduction to organic chemistry; Chemistry of petroleum fluids; hydrocarbon, oxygen, sulphur and nitrogen compounds; Introduction to surface chemistry; Emulsions and surfactants; Corrosion and chemical prevention.

Course Code:	PNGE3112	Course Title:	Introduction to Petroleum & Natural Gas Engineering
No. of credit hours:	2	No. of contact hours:	4

A short description:

This course gives a brief idea about introduction to petroleum and natural gas engineering as part of the petroleum and natural gas engineering curriculum. The class includes Elementary knowledge and assessment of petroleum and natural gas; Overview of petroleum industry and petroleum engineering; Nature of oil and gas reservoirs; Petroleum exploration and drilling; Formation evaluation, Completion and production, Surface facilities, Reservoir mechanics; Improved oil recovery; Relevant terminology and nomenclature.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	PNGE3202	Course Title:	Numerical Methods
No. of credit hours:	3	No. of contact hours:	4

A short description:

To provide students with the basic knowledge of numerical methods enabling them to appreciate approximation, analyze computational errors; utilize numerical techniques for root-finding, numerical linear algebra, curve fitting, differentiation and integration and numerical solution to ordinary differential equations. Computer software (e.g. MATLAB) is used for the implementation and application of the numerical methods' techniques, through tutorials and assignments.

Course Code:	PNGE3212	Course Title:	Rock and Fluid Properties
No. of credit hours:	3	No. of contact hours:	4

A short description: This course deals mainly with theories and measurements of the rock and fluid properties. The first part of the course describes the properties of rocks (porosity, permeability, and compressibility). The second part of the courses describes the fluid properties, which includes classification of types of reservoir fluids, Phase behaviour, The types of reservoir fluids, Properties of ideal and real fluids, Definitions of basic PVT properties (Elementary Volumetric Phase Behaviour), Definition of fluid properties such as formation volume factors, shrinkage factors, Concept of fluid viscosity. The third part of the course describes the interaction of rock and fluids like Relative permeability, Capillary pressure, Interfacial tension and Wettability. This course also includes a session of laboratory class. The students are asked to prepare, setup and take measurements in each week according to the lab schedule.

Course Code:	PNGE4101	Course Title:	Statistics for Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces the students to the basic concepts of statistics and probability that can be used in many engineering fields and in particular in the analysis of experimental data. The examples and exercises emphasize applications in engineering as general and petroleum, chemical, and mineral resources in particular. MINITAB and Excel will be used during the tutorial lab.

Course Code:	PNGE4212	Course Title:	Drilling Technology
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course gives an introduction to oil well drilling. The aim of this course is to provide a clear coverage of the principals of oil well drilling engineering. The class includes an introduction to drilling, hoisting, drill string design, drilling bits, mud engineering, rig hydraulics, casing design, cementing, blowout control, directional drilling, hole problems, and an introduction to well completion and stimulation.

Course Code:	PNGE4312	Course Title:	Drilling Technology Lab
No. of credit hours:	1	No. of contact hours:	2

A short description:

This course gives the students an introduction to drilling laboratory measurements. The students are asked to prepare, set-up and take measurements in each week according to the lab schedule. The objective is to measure drilling fluid properties. Properties are measured for both drilling mud and drilling cements. Measurements include mud and cement density, mud and cement viscosity, mud and cement fluid loss, and compressive strength of set cement.

Course Code:	PNGE4412	Course Title:	Reservoir Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description :

This is an intermediate level reservoir engineering course. Students are introduced to reservoir characteristics; Oil and gas volumetric; Reservoir mechanics: reservoir energy, drive mechanisms, and recovery factors; Material balance equations: oil and gas material balance, material balance calculations for various reservoir types and applications, drive indexes; Decline curves and reserves.

ACADEMIC DEPARTMENTS

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Course Code:	PNGE4512	Course Title:	Formation Evaluation
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course deals mainly with theories of well log analyses and their applications. The course begins with the description and purposes of formation evaluation using well logs. After revising the formation and rock properties, the Archie Equation and its modified versions are introduced. Main emphasis is on the resistivity concept and porosity. After a brief description of the data acquisition principles, the use of the resistivity, triple porosity, gamma ray and SP logs are discussed and the discussion is strengthened with practical applications. Finally, STOIP calculations and porosity-permeability relationships are covered with a case study (a full well log analysis) solved in the classroom.

Course Code:	PNGE4612	Course Title:	Well Testing
No. of credit hours:	3	No. of contact hours:	4

A short description:

This is an advanced level course designed for formulation and analysis of fluid flow in porous media. Topics covered: Review of the mathematical basis for pressure analysis; Solution of diffusivity equation: steady/semi-steady state and transient; Oil and gas well testing; Multi-rate multi-well pressure transient test; Modern methods.

Course Code:	PNGE4712	Course Title:	Reservoir Simulation
No. of credit hours:	3	No. of contact hours:	4

A short description:

Topics covered in this course are: Formulation of single phase; Multidimensional fluid flow equations in porous media; Approximation of partial differential equations using finite difference schemes, grid types and boundary conditions; Solution of the incompressible fluid flow equation (elliptic PDE), solution of the slightly compressible fluid flow equation (parabolic PDE); Multiphase hydrocarbon reservoir simulation using well established black-oil simulators.

Course Code:	PNGE5001	Course Title:	Cooperative Training 1
No. of credit hours:	0	No. of contact hours:	

A short description:

Co-Operative Training courses are optional. These are designed for students who are following Scheme-I or Scheme-II and willing to take a one-year Co-Op program after finishing semester-8. Internal regulations apply.

Course Code:	PNGE5002	Course Title:	Cooperative Training 2
No. of credit hours:	6	No. of contact hours:	

A short description:

Co-Operative Training courses are optional. These are designed for students who are following Scheme-I or Scheme-II and willing to take a one-year Co-Op program after finishing semester-8. Internal regulations apply.

Course Code:	PNGE5106	Course Title:	Machine Learning for Petroleum and Chemical Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims at placing students in the real environment of machine learning (ML) algorithms and their vast applications in the petroleum and chemical engineering disciplines. By means of a combination of theoretical examination and practical exercises, students practice hands-on case studies on ML models that are specially designed to cope with these industries' specific problems. Ranging from reservoir characterization and simulation in petroleum engineering to process design and optimization in chemical engineering, students are taught the use of machine learning (ML) algorithms like neural networks, support vector machines, and decision trees for analyzing data from rocks, fluids, chemical processes, and process equipment. Through the process of learning the ML methods application to the real-world problems and challenges of petroleum and chemical engineering, students acquire the skills required to drive the innovation, enhance productivity, and decision making in these dynamic fields.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	PNGE5112	Course Title:	Production Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course introduces students to petroleum production systems. The topics covered are: Overview of surface facilities; Gravel pack completions; Wellbore flow performance and well deliverability; Pressure loss calculations; Matrix acidizing; Hydraulic fracturing; Gas lift; Sucker rod pumping.

Course Code:	PNGE5115	Course Title:	Project I
No. of credit hours:	2	No. of contact hours:	4

A short description:

Engineering design by definition is the integration of knowledge and skills acquired through experience, reading and formal instruction into a final product. This course is the first course of a 2-course, 2-semester, sequence that will result in a comprehensive capstone-engineering project. It is an introduction course to exploration and production business. The course should lead to a basic understanding of sub-surface disciplines. A real field data will be used to deliver Field Development Plan (FDP). This will build knowledge in many areas such as geology, petro-physics, reservoir-engineering and production technology. Volumetric calculations, prediction of primary and secondary recoveries also will be incorporated. Furthermore, sub-surface uncertainties and their impact on the short & long term development plans will be analyzed in this course. Finally building team working skills is one of the key objectives of the course and these skills are essential in enabling the setting up of personal networks. As such, the two courses will utilize the knowledge gained from previous PNGE subjects to the project design. The class will be divided into teams and students will be evaluated based on their contribution to the team effort. All reports and presentations will be presented to the class as a product of the team.

Course Code:	PNGE5116	Course Title:	Underground Gas Storage
No. of credit hours:	3	No. of contact hours:	4

A short description:

This comprehensive course explores the diverse realm of gas storage and its vital role in sustainable energy practices. Through ten meticulously crafted modules, students will gain insights into the intricacies of gas storage, covering hydrogen, hydrocarbon, and CO₂ storage techniques. The journey begins with an overview of gas storage challenges and strategies, delving into the technological innovations that shape the landscape of gas storage. The core modules focus on the dynamics of hydrogen, hydrocarbon, and CO₂ storage, addressing capacity, geologic and surface implications, and providing a comparative analysis of their approaches. Students will acquire knowledge of reservoir concepts, pore space storage dynamics, and key factors such as relative permeability and capillary pressure in dynamic reservoir modelling. The course delves into the critical aspects of storage risks, encompassing geochemical and geomechanical prerequisites and ensuring seal integrity. The final modules explore the diverse applications of stored gases for sustainable energy, offering a comprehensive understanding of advanced strategies in gas storage and their implications for the future of energy.

Course Code:	PNGE5122	Course Title:	Introduction to Rock Mechanics
No. of credit hours:	3	No. of contact hours:	4

A short description:

Rock mechanics is the study of mechanics applied to rock and masses. It is used by a wide variety of geo-science and engineering disciplines, such as geology, civil and petroleum. Topics covered in this course are: Stress and strain analysis; Linear elasticity theory; Mechanical properties of rock; Rock mass characteristics and classification systems; Response of rock mass to excavations.

ACADEMIC DEPARTMENTS

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Course Code:	PNGE5202	Course Title:	Well Simulation
No. of credit hours:	3	No. of contact hours:	4

A short description:

The Well Stimulation course delves into the science and practice of enhancing oil and gas production from existing wells. It covers key techniques like hydraulic fracturing, acidizing, and stimulation using many techniques, exploring their mechanisms, applications, and optimization. Students gain a deep understanding of how these techniques work, their advantages and limitations, and the economic and environmental considerations involved. This course equips students with valuable knowledge and skills for effectively designing and implementing well stimulation strategies, contributing to the efficiency and profitability of oil and gas operations.

Course Code:	PNGE5203	Course Title:	Management for Petroleum and Chemical Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the essential elements for managing resources such as planning, organizing, leading and controlling. In addition, the following topics are covered: mineral resources and types; uniqueness of mineral industries; management science techniques and optimization of scarce resources, theory of optimal depletion, exploitation, environmental impacts and sustainable development.

Course Code:	PNGE5212	Course Title:	Secondary and Enhanced Oil Recovery
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course provides an overview of secondary and enhanced oil recovery (EOR) techniques and their evaluation. The topics covered are: Frontal-advance theory and application; Mechanisms of water flooding processes, and application to reservoir performance prediction; Water flooding and EOR applications.

Course Code:	PNGE5215	Course Title:	Project II
No. of credit hours:	3	No. of contact hours:	4

A short description:

Engineering design by definition is the integration of knowledge and skills acquired through experience, reading and formal instruction into a final product. This course is the first course of a 2-course, 2-semester, sequence that will result in a comprehensive capstone-engineering project. It is an introduction course to exploration and production business. The course should lead to a basic understanding of sub-surface disciplines. A real field data will be used to deliver Field Development Plan (FDP). This will build knowledge in many areas such as geology, petro-physics, reservoir-engineering and production technology. Volumetric calculations, prediction of primary and secondary recoveries also will be incorporated. Furthermore, sub-surface uncertainties and their impact on the short & long term development plans will be analyzed in this course. Finally building team working skills is one of the key objectives of the course and these skills are essential in enabling the setting up of personal networks. As such, the two courses will utilize the knowledge gained from previous PNGE subjects to the project design. The class will be divided into teams and students will be evaluated based on their contribution to the team effort. All reports and presentations will be presented to the class as a product of the team.

Course Code:	PNGE5216	Course Title:	Special Topics
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course starts from the introduction to environmental issues and risk concepts. The global commitments, environmental law, regulations, and ISO (International Organization for Standardization) standards will be explained. Zero-waste concept will be discussed in align with the strategy of "prevention instead of treatment". Separation and purification operations will be discussed and analyzed to minimize energy consumption and materials use. The energy efficiency enhancement and complexity of the process will be covered. Integration approaches for material and energy flows will be analyzed. This course will also address the renewable material and energy inputs in comparison with depleting sources to ensure the green engineering design. At the end of this course, selected case studies will be solved considering the green engineering principles.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	PNGE5302	Course Title:	Well Control
No. of credit hours:	3	No. of contact hours:	4

A short description:

Well Control course covers basic concepts and procedures in well control; theory and mathematical applications; preliminary equipment designs and applications; Onshore and offshore scenarios for well design. The course gives an overview of causes of kicks, kick detection, pressure concepts and calculations, well control procedures, characteristics of kick fluids and their behaviour, constant bottom hole pressure well control methods and equipment.

Course Code:	PNGE5402	Course Title:	Petroleum and data Analytics
No. of credit hours:	3	No. of contact hours:	4

A short description:

Overview of data science concepts. Definition of data and data types. Types of data collected during upstream oil and gas activities. Basic principles of descriptive and inferential statistics. Exploratory data analysis as applied to petroleum data. Data visualization. Introduction to supervised and unsupervised machine learning. Applications with modern computational tools and packages. Case studies for petroleum engineering.

Course Code:	PNGE5412	Course Title:	Field Processing of Natural Gas
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course is designed to provide students with the basic understanding of gas phase behaviour, gas production and processing. The student will be equipped with basic tools to design and optimize gas processing related problems.

Course Code:	CHPE3102	Course Title:	Engineering Thermodynamics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Basic concepts of thermodynamics; PVT of pure fluids and equations of state; First and second laws; Thermodynamic properties of pure fluids; Applications to flow processes.

Course Code:	CHPE3302	Course Title:	Fluid Flow
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Fluid statics; Newtonian and non-Newtonian fluids; Bernoulli equation; Flow of fluids; Flow meters, Pumps and compressors; Two-phase flow, Fluid flow in porous media, Packed and Fluidized beds; Agitation and mixing.

Course Code	PNGE 2102	Course Title	Basic Mechanics
No. of credit hours:	3	No. of contact hours:	4

A short description:

PNGE students are introduced to the basic mechanics of particles and rigid bodies. The course has two parts. Statics part covers: Concepts of force, Moment, Resultant, Free body diagram; Equilibrium state and friction. Dynamics part covers: Concepts of velocity; Acceleration; Inertia forces; Centrifugal forces; Particle and rigid body dynamics.

Course Code	CHPE 3402	Course Title	Heat Transfer
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Concepts and theories of heat transfer; Introduction to different modes of heat transfer; Steady state and transient heat transfer: Conduction, natural and forced convection, and radiation; Heat Transfer coefficients; Introduction to heat exchangers.

Course Code	ECCE3015	Course Title	Electrical Engineering Fundamentals
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to DC circuits, AC circuits, three-phase circuits, transformers, DC and AC machines. Basics of electronic devices and their applications.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

• BSc. in Chemical and Process Engineering

Course Description

Course Code:	CHPE3101	Course Title:	Materials Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers Materials engineering; Properties and performance; Crystalline phases; Imperfection in crystalline solids; Solid solution; Elastic and Plastic deformation; Hardness testing; Fatigue and creep testing; Phase diagrams, engineering alloys and Corrosion.

Course Code:	CHPE3102	Course Title:	Engineering Thermodynamics
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Basic concepts of thermodynamics; PVT of pure fluids and equations of state; First and second laws; Thermodynamic properties of pure fluids; Applications to flow processes.

Course Code:	CHPE3103	Course Title:	Professional Practice
No. of credit hours:	2	No. of contact hours:	2

A short description:

This course introduces the student to basic issues in Engineering Ethic by the study of the morality of engineers' actions, duties and ideals and their interactions and consequences on the society. The societal responsibilities of engineers are analyzed through chemical and petroleum engineering code of practice. Thus, students will understand issues such as: moral autonomy, corporate responsibility, whistle blowing, conflict of interest, risk assessment, environment and sustainable development.

Course Code:	CHPE3112	Course Title:	Principles of Chemical Processes
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers Application of physical and chemical principles to problems in chemical and processing industries; Stoichiometry; Processes and process variables, Thermodynamic data; Material balance on non-reactive and reactive systems. General energy balance; Heat of reactions; Energy balance for reactive systems.

Course Code:	CHPE3212	Course Title:	Chemical Process Industries
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces a theoretical study of a number of chemical industries and processes of strategic importance to Oman as well as other industries outside Oman; petrochemical, fertilizer industry, LNG, water/sewage treatment soaps and detergents, cement, food processing, glass, electrochemical, plastics, perfumes, fuel gases etc.

Course Code:	CHPE3302	Course Title:	Fluid Flow
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Fluid statics; Newtonian and non-Newtonian fluids; Bernoulli equation; Flow of fluids; Flow meters, Pumps and compressors; Two-phase flow, Fluid flow in porous media, Packed and Fluidized beds; Agitation and mixing.

Course Code:	CHPE3402	Course Title:	Heat Transfer
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Concepts and theories of heat transfer; Introduction to different modes of heat transfer; Steady state and transient heat transfer: Conduction, natural and forced convection, and radiation; Heat Transfer coefficients; Introduction to heat exchangers.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	CHPE4102	Course Title:	Polymers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course offers an overview of engineering analysis and design techniques for synthetic polymers. It includes polymerization reactions, mechanical and viscoelastic characterization, deformation mechanisms, processing and polymer rheology. Additional topics on biopolymers and nanotechnology will be covered.

Course Code:	CHPE4106	Course Title:	Introduction to Colloids and Interface Science
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims to introduce the students to the science and applications of colloids and interfaces. Topics covered are: introduction to colloids, surface tension, wettability, capillarity, intermolecular and surfaces forces, DLVO theory, emulsions, colloidal stability in presence of polymers and surfactants.

Course Code:	CHPE4112	Course Title:	Chemical Engineering Thermodynamics
No. of credit hours:	3	No. of contact hours:	4

A short description:

The objective of this course is to develop the laws of thermodynamics into working equations, and to cover the fundamental property relations, residual properties, vapor-liquid equilibrium of ideal and non-ideal systems and chemical reaction equilibrium in order to apply these concepts in the design of chemical process equipment.

Course Code:	CHPE4114	Course Title:	Computer Aided Design
No. of credit hours:	2	No. of contact hours:	4

A short description:

This course covers: Modelling and simulation; Introduction to computational tools available for the solution of chemical and process engineering problems; Chemical process simulators; Spreadsheets.

Course Code:	CHPE4116	Course Title:	Green Hydrogen and Energy Storage
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course focuses on designing and engineering electrochemical energy storage, covering hydrogen production, fuel cells, batteries, and supercapacitors. Students will learn about design considerations, material selection, and optimization strategies for water electrolysis, hydrogen storage, fuel cell stacks, battery cells, and supercapacitor systems. Through hands-on projects and case studies, students will gain experience in designing and optimizing components and processes for green hydrogen production and energy storage. The course equips students with the knowledge and skills necessary to develop electrochemical energy storage solutions for modern energy systems.

Course Code:	CHPE4202	Course Title:	Corrosion Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course in corrosion engineering introduces corrosion and its adverse effects on engineering equipment and processes. The main topics to be covered include: Principles of corrosion, types of corrosion, corrosion control, cathodic protection, corrosion inhibitors, corrosion prevention, corrosion testing and material selection.

Course Code:	CHPE4206	Course Title:	Introduction to Nanotechnology
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the following topics: nanotechnology, nanomaterials, atoms, molecules & clusters, colloids, top down approach, bottom up approach, property changes with size scaling, synthesis of nanomaterials, applications of nanomaterials, sensors.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	CHPE4212	Course Title:	Unit Operations I
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Molecular, convective and interphase mass transfer; Transport properties; Continuous and stage-wise mass transfer; Absorption/stripping operations; Design of certain separation equipment.

Course Code:	CHPE4302	Course Title:	Desalination
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims at studying industrial desalination processes. Topics covered include global and local water resources, water quality and analysis, technical and economic analysis of major desalination processes such as multi-stage flash, reverse osmosis, multiple-effect distillation and electro dialysis.

Course Code:	CHPE4306	Course Title:	Wastewater Treatment
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims to provide students with an overview of the theory and practice of wastewater treatment. The course covers wastewater treatment concepts including key constituents and quality standards. This course will help students develop the ability to apply basic understandings of physical, chemical, and biological phenomena to the successful design and operation of wastewater treatment plants.

Course Code:	CHPE4312	Course Title:	Chemical Engineering Lab I
No. of credit hours:	2	No. of contact hours:	4

A short description:

This is the first of a three-semester laboratory course sequence involving experiments covering the application of fundamental principles of chemical and process engineering to thermodynamics, fluid flow, and heat transfer. Experimental planning, automated data acquisition and report writing are stressed. Safety considerations are emphasized throughout.

Course Code:	CHPE4402	Course Title:	Natural Gas Processing
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces different techniques for processing natural gas. Topics include: Natural gas properties including real gas mixtures behaviour and the equations of state; Natural gas water systems, natural gas condensate systems, hydrate formation and inhibition; Separation processes; Field treatment of natural gas, absorption, and adsorption processes; Natural gas dehydration, sweetening and sulphur recovery.

Course Code:	CHPE4406	Course Title:	Sustainable Energy
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course presents the various sources of sustainable energy, including wind, solar, and biomass, as potential energy sources. It investigates the contribution these sources can make to the nation's energy profile. The technology used to harness these resources will also be presented.

Course Code:	CHPE4512	Course Title:	Chemical Reaction Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers kinetics of homogeneous and heterogeneous reactions, design of isothermal reactors such as Batch, CSTR and PFR. Other topics include data collection and handling; catalysis and catalytic reactions; non-isothermal reactor design; multiple reactions; and residence time distribution.

Course Code:	CHPE4612	Course Title:	Unit Operations II
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers: Distillation; Liquid-liquid and solvent extraction; Design of industrial separation equipment. Flow sheeting programs will be used.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	CHPE4712	Course Title:	Chemical Engineering Lab II
No. of credit hours:	2	No. of contact hours:	4

A short description:

This is the second of a three-semester laboratory course sequence that involves experiments, covering the application of fundamental principles of chemical and process engineering to process unit operations. Experimental planning, automated data acquisition and report writing are stressed.

Course Code:	CHPE5001	Course Title:	Cooperative Training 1
No. of credit hours:	0	No. of contact hours:	

A short description:

Co-Operative Training courses are optional. These are designed for students who are following Scheme-I or Scheme-II and willing to take a one-year Co-Op program after finishing semester-8. Internal regulations apply.

Course Code:	CHPE5002	Course Title:	Cooperative Training 2
No. of credit hours:	6	No. of contact hours:	

A short description:

Co-Operative Training courses are optional. These are designed for students who are following Scheme-I or Scheme-II and willing to take a one-year Co-Op program after finishing semester-8. Internal regulations apply.

Course Code:	CHPE5106	Course Title:	Carbon Capture Utilization and Storage
No. of credit hours:	3	No. of contact hours:	4

A short description:

This dynamic course delves into the multifaceted world of carbon management, decarbonization, and sustainable energy practices through ten meticulously crafted modules. The journey commences with an exploration of the carbon challenge, decarbonization strategies, and the pivotal roles played by Carbon Capture and Storage (CCS) and Carbon Capture and Utilization (CCU) in mitigating carbon emissions. Modules proceed to dissect the intricacies of various carbon capture methods, their efficiency, and the technological innovations shaping their impact. A deep dive into CO₂ storage techniques and their capacity, geologic and surface implications, and a comparative analysis of CCS and CCU approaches forms the core of this course. Participants are equipped with reservoir concepts, pore space storage dynamics, and an introduction to relative permeability, capillary pressure, and their connections to dynamic reservoir modelling. In the final modules, the course explores the potential applications of captured CO₂ and various hydrogen sources for sustainable energy applications, providing a comprehensive understanding of advanced strategies in carbon capture and sustainable energy practices.

Course Code:	CHPE5116	Course Title:	Biochemical Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims at covering topics in application of chemical engineering principles to biochemical processes. Topics include: basics of biology, enzymes, cells work, microbial growth, metabolic pathways, operation and control of bioreactors, recovery and purification of products.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	CHPE5206	Course Title:	Hydrogen Technology
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course begins by introducing the hydrogen economy and its role in achieving Carbon Neutrality by 2050. The hydrogen value chain will be discussed. Each section of the hydrogen value chain will be explained and analyzed with respect to process systems engineering. Sources/feedstocks for the hydrogen production in alignment of different colors of hydrogen will be explained. The engineering perspectives of the hydrogen production technologies and associated constraints will be covered. Hydrogen separation and purification approaches will be discussed. Different technologies for hydrogen storage and transportation will also be covered in this course. At the end of this course, different criteria including economic, TRL, and CRL to choose an optimum hydrogen value chain for industrial-scale applications will also be discussed.

Course Code:	CHPE5207	Course Title:	Petroleum Refining Processes
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course describes all the processes involved in modern crude oil refineries such as desalting, atmospheric distillation, vacuum distillation, thermal cracking, catalytic cracking, hydrotreating, catalytic reforming, isomerization, polymerization, absorption processes, adsorption processes, gasoline blending, wastewater treatment, and sulphur removal. It starts with an introduction to crude oil composition and characterization and specifications of the desired products from refineries.

Course Code:	CHPE5212	Course Title:	Chemical Engineering Lab III
No. of credit hours:	2	No. of contact hours:	4

A short description:

This is the third of a three-semester laboratory course sequence involving experiments covering the application of fundamental principles of process control as well as reaction engineering in chemical engineering operations. In the process control experiments, the students will practice on areas such as level, flow, pressure and temperature control and instrumentations. Additionally, in the reaction engineering experiments, the batch, continuous and tubular reactors will be covered. Experimental planning, automated data acquisition and report writing are stressed.

Course Code:	CHPE5216	Course Title:	Green Process Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

The course will start from the introduction to environmental issues and risk concepts. The global commitments, environmental law, regulations, and ISO (International Organization for Standardization) standards will be explained. Zero-waste concept will be discussed in align with the strategy of “prevention instead of treatment”. Separation and purification operations will be discussed and analyzed to minimize energy consumption and materials use. The energy efficiency enhancement and complexity of the process will be covered. Integration approaches for material and energy flows will be analyzed. This course will also address the renewable material and energy inputs in comparison with depleting sources to ensure the green engineering design. At the end of this course, selected case studies will be solved considering the green engineering principles.

Course Code:	CHPE5312	Course Title:	Project I
No. of credit hours:	2	No. of contact hours:	2

A short description:

This is the first part of the cap-stone design project. Students perform raw material selection, process selection and flow sheeting, mass and energy balance, and plant location.

Course Code:	CHPE5316	Course Title:	Optimization in Chemical Engineering
No. of credit hours:	3	No. of contact hours:	4

A short description:

The objective of this course is to introduce optimization techniques to engineering students, with an emphasis on problems arising in Chemical Engineering applications. The course includes both linear and nonlinear programming problems. The first portion of the course introduces the basic concepts in optimization and how to obtain a mathematical representation of the optimization problem. The second portion of the course describes different solution techniques that can be used to actually solve such problems. Finally, a set of software tools (MATLAB Optimization Toolbox, MS Excel Solver and Aspen Plus/Hysys) for solution of optimization problems are also discussed. Upon successful completion of this course, the student will be able to understand the basic theoretical principles in optimization, formulate the optimization problem, and choose appropriate method/solver for solution of the optimization problem.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	CHPE5412	Course Title:	Plant and Process Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course intends to introduce students to the principles of chemical process design, process flow diagrams including symbols, piping and instrumentation, representation of the structure of complex, interconnected chemical processes with recycles streams, general design considerations regarding environmental, health, safety and selection of plant location and layout, process design development, selection, materials of construction and corrosion considerations. Capital and operating cost estimation and profitability analysis.

Course Code:	CHPE5416	Course Title:	Applied Separation Processes
No. of credit hours:	3	No. of contact hours:	4

A short description:

Various Chemical Engineering Unit Operations will be introduced in this course. General principles and design of applied separation processes in chemical engineering will be covered in this course. Separation of heterogeneous mixtures as well as homogeneous solutions will be studied including evaporation, humidification, drying, adsorption, membrane separation processes and filtration. At the end of this course, general guidelines for selecting the appropriate separation methods for specific applications will be introduced.

Course Code:	CHPE5512	Course Title:	Project II
No. of credit hours:	3	No. of contact hours:	2

A short description:

This is the second part of the cap-stone design project. Students perform detailed design of the major equipment, process control, HSE studies, and economic analysis.

Course Code:	CHPE5612	Course Title:	Chemical Process Safety
No. of credit hours:	3	No. of contact hours:	4

A short description:

A study of the fundamentals of chemical process safety. It includes toxicology, industrial hygiene, source models, fires and explosions, relief systems, hazard identification, risk assessment, accident investigations, and process safety management.

Course Code:	CHPE5712	Course Title:	Process Integration, Synthesis and Simulation
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course presents systematic process-integration tools for the synthesis, development, and screening of potential process flowsheets. It includes Introduction to Process Design, Global Analysis of Mass and Energy Flows, Mass Integration, Energy Integration.

Course Code:	CHPE5812	Course Title:	Heterogeneous Catalysis and Reactor Design
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers definition of heterogeneous catalysis; properties of catalysts; catalyst preparation; catalyst characterization; kinetics of catalytic reactions; ideal heterogeneous reactors; non-isothermal reactor design; mass and heat transfer effects in heterogeneous reactors; catalysis in petrochemicals and environmental protection. A number of practical sessions will support this course.

Course Code:	PNGE3202	Course Title:	Numerical Methods
No. of credit hours:	3	No. of contact hours:	4

A short description:

To provide students with the basic knowledge of numerical methods enabling them to appreciate approximation, analyze computational errors; utilize numerical techniques for root-finding, numerical linear algebra, curve fitting, differentiation and integration and numerical solution to ordinary differential equations. Computer software (e.g., MATLAB) is used for the implementation and application of the numerical methods' techniques, through tutorials and assignments.

Course Code:	PNGE4101	Course Title:	Statistics for Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course introduces the students to the basic concepts of statistics and probability that can be used in many engineering fields and in particular in the analysis of experimental data. The examples and exercises emphasize applications in engineering as general and petroleum, chemical, and mineral resources in particular. MINITAB and Excel will be used during the tutorial lab.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	PNGE5106	Course Title:	Machine Learning for Petroleum and Chemical Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims at placing students in the real environment of machine learning (ML) algorithms and their vast applications in the petroleum and chemical engineering disciplines. By means of a combination of theoretical examination and practical exercises, students practice hands-on case studies on ML models that are specially designed to cope with these industries' specific problems. Ranging from reservoir characterization and simulation in petroleum engineering to process design and optimization in chemical engineering, students are taught the use of machine learning (ML) algorithms like neural networks, support vector machines, and decision trees for analyzing data from rocks, fluids, chemical processes, and process equipment. Through the process of learning the ML methods application to the real-world problems and challenges of petroleum and chemical engineering, students acquire the skills required to drive the innovation, enhance productivity, and decision making in these dynamic fields.

Course Code:	PNGE5203	Course Title:	Management for Petroleum and Chemical Engineers
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course covers the essential elements for managing resources such as planning, organizing, leading and controlling. In addition, the following topics are covered: mineral resources and types; uniqueness of mineral industries; management science techniques and optimization of scarce resources, theory of optimal depletion, exploitation, environmental impacts and sustainable development.

Course Code:	CHEM3339	Course Title:	Industrial Electrochemistry
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course will focus on the fundamental principles involved in electrode processes relevant to a number of industrial activities. It will describe core aspects of electrochemical concepts including solution conductivity, electrode thermodynamics and electrode reactions. Case studies will consider crucial problems in current areas such as; Industrial Production (Four Models), Energy Production (Batteries and Fuel Cells), Water Purification (Metal Ions Removal, Electro-Dialysis, Flue Gas Desulfurization), Metal Finishing (Electro-Plating, Conversion Coatings, Electrophoretic Painting) and a short introduction to Corrosion Chemistry.

Course Code	ECCE3015	Course Title:	Electrical Engineering Fundamentals
No. of credit hours:	3	No. of contact hours:	4

A short description:

Introduction to DC circuits, AC circuits, three-phase circuits, transformers, DC and AC machines. Basics of electronic devices and their applications.

Course Code	CHEM3348	Course Title	Introduction to Chemical and Instrumental Analysis
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course is designed specifically to non-chemistry majors who need a broad-based introduction to chemical analysis and analytical instrumentation. The course covers fundamentals of modern analytical instrumentation, providing general background theory and principles of operation.

Course Cod	CHPE4412	Course Title	Process Heat Transfer
No. of credit hours:	3	No. of contact hours:	4

A short description:

This course aims at investigating the design and the implementation of industrial heat exchangers. It provides the background needed to understand and master the commercial software packages used by professional engineers for design and analysis of heat exchangers. It also focuses on the types of heat exchangers most widely used by industry, namely shell-and-tube exchangers (including condensers, reboilers and vaporizers), air-cooled heat exchangers and double-pipe (hairpin) exchangers. It provides a substantial introduction to the design of heat exchanger networks using pinch technology, the most efficient strategy used to achieve optimal recovery of heat in industrial processes.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

- MSc. in Petroleum and Natural Gas Engineering**

Course Description

Course Code:	PNGE6001	Course Title:	Transport Processes in Porous Media
No. of credit hours:	3	No. of contact hours:	3

A short description :

This course provides a comprehensive understanding of the fundamental principles governing fluid flow and transport phenomena in porous media. Students will explore the physical laws and mathematical models used to describe single and multiphase flow, dispersion, and capillary pressure, with a focus on applications in hydrocarbon reservoir. Through a combination of lectures, problem-solving sessions, and potentially software-based exercises, students will develop the skills to analyze and predict fluid flow behaviour in complex porous systems.

Course Code:	PNGE6002	Course Title:	Advanced Reservoir Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description :

This course explores advanced principles of reservoir engineering, emphasizing the development and application of flow equations for diverse reservoir scenarios, including various geometries, fluid types, multiphase flow, and dynamic conditions. Key topics include material balance techniques, decline curve analysis, water influx models, and the utilization of the frontal advance equation to evaluate reservoir performance. With a strong focus on problem-solving, the course integrates theoretical frameworks with practical applications, preparing students to address real-world challenges in reservoir characterization and management effectively.

Course Code:	PNGE6101	Course Title:	Advanced Production Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

Production system analysis, reservoir performance, flow in pipes and restrictions, total system analysis, artificial lift analysis and design.

Course Code:	PNGE6102	Course Title:	Natural Gas Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

Gas properties, gas reservoir performance, piping system performance, gas compression, total system analysis, flow measuring, gas-condensate reservoirs, field operation problems, gas processing.

Course Code:	PNGE6103	Course Title:	Applied Reservoir Simulation
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course delves into advanced reservoir simulation concepts, focusing on the formulation of multi-phase and multidimensional fluid flow equations in porous media, the approximation of partial differential equations using finite difference schemes, and the role of grid types and boundary conditions in numerical modeling. It provides students with the theoretical foundation to solve incompressible and slightly compressible fluid flow equations, preparing them to address complex reservoir challenges. A key feature of the course is hands-on experience with commercial reservoir simulation software, enabling students to implement and evaluate production scenarios such as enhanced recovery techniques, water flooding, and gas injection. Additionally, students will develop and code a basic reservoir simulation model, like linear single-phase flow, fostering a comprehensive understanding of simulation principles and computational techniques.

Course Code:	PNGE6104	Course Title:	Reservoir Characterization and Evaluation
No. of credit hours:	3	No. of contact hours:	3

A short description:

Deterministic and stochastic (statistical, geostatistics and fractal techniques) methods in reservoir characterization. Analysis of well logs, well test and outcrop data to describe the reservoir and evaluate the distribution of reservoir properties. Preparation of data for numerical simulation (static model).

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	PNGE6105	Course Title:	Enhanced Oil Recovery Methods
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course provides an advanced exploration of Enhanced Oil Recovery (EOR) techniques, emphasizing the theoretical foundations, mechanisms, and practical applications of chemical, miscible, and thermal EOR processes. Topics include microscopic and macroscopic displacement efficiencies, polymer and surfactant flooding, miscible displacement mechanisms, and thermal recovery processes such as steam injection and in-situ combustion. A key component of the course is the application of commercial reservoir simulation software to design, analyze, and optimize EOR strategies in realistic scenarios. Students will gain a comprehensive understanding of advanced EOR methods and their integration into reservoir management to maximize oil recovery efficiency and economic feasibility.

Course Code:	PNGE6108	Course Title:	Thermophysical properties of oils and gases
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course is designed to provide students with the basic understanding of the methods for obtaining thermodynamic and transport properties of petroleum reservoir fluids including natural gases and oils. Oil and gas property measurements, equations of state, characterization procedures, simulation of PVT experiments, tuning of equations of state parameters, transport properties (viscosity, thermal conductivity) and surface tension will be discussed, wax formation and inhibition, gas hydrates as well as simulation of miscible gas injection will be covered in this course.

Course Code:	PNGE6111	Course Title:	Advanced Petroleum Geology
No. of credit hours:	3	No. of contact hours:	3

A short description:

Processes of sedimentation and diagenesis. Sedimentary rocks: description, identification, classification, petrophysical properties, porosity, and permeability. Environment of deposition, basin analysis. Hydrocarbon entrapment. Naturally fractured reservoirs. Geology of the Arabian Plate. Geology of Oman.

Course Code:	PNGE6112	Course Title:	Applied Geostatistics
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course discusses exploratory data analysis, description of spatial patterns, modelling of spatial variability, and spatial prediction. The course particularly emphasizes the applications of geostatistics in oil reservoir characterization. However, the technique is also applied to different areas in geosciences, including but not limited to hydrology, soil sciences, mining engineering, and environmental monitoring.

Course Code:	PNGE6121	Course Title:	Economic Evaluation of Subsurface Reservoirs
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course intends to cover reserve estimation, decline analysis, petroleum property evaluation including, oil field accounting, cost estimation and overall development evaluation. Overview investment decision analysis and computer application in property evaluation are also covered in this course.

Course Code:	PNGE6211	Course Title:	Petroleum Data Mining
No. of credit hours:	3	No. of contact hours:	3

A short description:

Data mining concepts. Data types for subsurface energy resources. Basic principles of descriptive and inferential statistics. Exploratory data analysis, data pre-processing and visualization as applied to petroleum data. Classification, association, clustering and anomaly detection algorithms. Data mining case studies for petroleum engineers.

Course Code:	PNGE6312	Course Title:	Production Enhancement
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course intends to cover different approaches to increase the productivity of a well. Matrix acidizing and hydraulic fracturing are the main possible approaches to enhance the production by well stimulation. Also different artificial lift methods such as gas lift, sucker rod pump, ESP, PCP, etc. are widely used to improve the performance of an oil well. In this course, focus will be on application, design, and optimization of the mentioned methods.

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Course Code:	PNGE6900	Course Title:	Special Topics
No. of credit hours:	3	No. of contact hours:	3

A short description:

Special topic that might include either or both research and literature survey as directed by advisor on subjects of interest pertaining to Oil Natural gas Industry.

Course Code:	PNGE7002	Course Title:	Master Thesis
No. of credit hours:	6	No. of contact hours:	

A short description:

The focus of the program is the undertaking of guided research combined with appropriate training. The supervisor will guide the candidate in the research project. The Candidate is required to conduct the necessary literature search, do the research, analyze the results, write the report and communicate the results at an oral defence. This work need no necessarily be original research, but will be a new application of ideas. The student preferably chooses the supervisor at the end of the first semester, but not later than the end of the second semester.

• MSc. in Chemical and Process Engineering

Course Description

Course Code:	CHPE6100	Course Title:	Advanced Transport Phenomena
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course covers study of transport phenomena including, momentum, heat, and mass transfer by molecular motion, laminar, turbulent flow and study of equations of continuity, motion and energy for isothermal and, non-isothermal multi- component systems.

Course Code:	CHPE6200	Course Title:	Advanced Chem. Eng. Thermodynamics
No. of credit hours:	3	No. of contact hours:	3

A short description:

Fundamental equation of pure material will be constructed from the equation of state and heat capacity. Single phase mixtures are synthesized from pure material using criteria of equilibrium to mix reversibly. Phase equilibrium and chemical equilibrium are treated for more complex applications of previous courses.

Course Code:	CHPE6300	Course Title:	Advanced Chemical Reaction Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course covers models for porous catalyst pellets and effectiveness factors applied in nonisothermal and nonideal reactors such as slurry reactors, different reactions mechanisms, and design of some industrial reactor such as reactor of synthesis of ammonia will be introduced.

Course Code:	CHPE5612	Course Title:	Chemical Process Safety
No. of credit hours:	3	No. of contact hours:	3

A short description:

A study of the fundamentals of chemical process safety. It includes toxicology, industrial hygiene, source models, fires and explosions, relief systems, hazard identification, risk assessment, accident investigations, and process safety management.

Course Code:	CHPE6110	Course Title:	Advanced Process Analysis and Control
No. of credit hours:	3	No. of contact hours:	3

A short description:

It involves the review, analysis and design of chemical process control systems; feedback and feedforward controllers for a single process; stability, tuning and simulation of PID controllers. It will then introduce advanced control algorithms, multivariable process control, model predictive control, digital sampling, digital control system and model identifications as these related to the issues of plantwide control.

ACADEMIC DEPARTMENTS

PETROLEUM AND CHEMICAL ENGINEERING

Course Code:	CHPE6210	Course Title:	Advanced Heat Transfer
No. of credit hours:	3	No. of contact hours:	3

A short description:

Study of energy transport in turbulent regime, interphase heat transfer coefficient, radiant energy transport and design of different heat transfer equipment such as heat exchangers, boilers, and condensers.

Course Code:	CHPE6310	Course Title:	Advanced Mass Transfer
No. of credit hours:	3	No. of contact hours:	3

A short description:

Study of mass transfer including mass transfer in a turbulent regime, eddy diffusivity, turbulent concentration profile, interphase mass transport, mass transfer coefficient for forced and free convection and macroscopic balance in multi component systems.

Course Code:	CHPE6410	Course Title:	Desalination Processes
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course covers definition and classifications of industrial desalination processes. Design of Single and multiple Effect Evaporation, multi-stage flash distillation and reverse osmosis processes. Desalination of brackish groundwater and high salinity surface water in inland locations. Such locations represent a challenge of concentrate handling and thus require operation at high product water recovery or zero-liquid discharge.

Course Code:	CHPE6510	Course Title:	Process Optimization
No. of credit hours:	3	No. of contact hours:	3

A short description:

A broad introduction to the theory and methods of modern process optimization, as applied to the design and operation of chemical process systems. Both unconstrained and constrained optimization methods based on direct search on gradient information are considered.

Course Code:	CHPE6610	Course Title:	Green Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

An introduction to environmental issues, risk concepts, environmental laws and regulations, the roles and responsibilities of chemical engineers, evaluating environmental fate, approaches based on chemical structure, evaluating exposures, evaluating environmental performance during process synthesis, unit operations and pollution prevention, environmental cost accounting.

Course Code:	CHPE6710	Course Title:	Industrial Wastewater Treatment
No. of credit hours:	3	No. of contact hours:	3

A short description:

Definitions, characteristics, survey and monitoring of industrial wastewater. Legislation guidelines and standards. Treatment processes: volume and strength reduction, neutralization, and equalization, removal of suspended and colloidal solids, removal of dissolved organics. Combined treatment of industrial wastewater with domestic sewage and treatment economics.

Course Code:	CHPE6810	Course Title:	Polymer Science and Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

This course is intended to provide a broad overview of polymer science and engineering. The emphasis will be given on the synthesis and structure of polymeric materials, the crystalline and glassy states, solution and melt properties, phase behaviour, mechanical and rheological properties.

Course Code:	CHPE6910	Course Title:	Catalysis
No. of credit hours:	3	No. of contact hours:	3

A short description:

In this course, the role of catalyst in the reaction and reactor design will be extensively discussed. Surface chemistry between reactant and catalyst, the rate of physical adsorption, chemisorption, different types of isotherms together with the characterization of catalyst will be covered. Catalyst preparation, poisoning and classification are part of the subjects of this course. Transport phenomena in the pores of catalyst which are completely different from that in the traditional systems and happen with different mechanism are the final section of this course.

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Course Code:	CHPE6500	Course Title:	Biochemical Engineering
No. of credit hours:	3	No. of contact hours:	3

A short description:

Biochemical processes, thermodynamics, and kinetics are used in the application of engineering principles to analyze, design, and develop processes using biocatalysts. Processes of interest include those that are involved in the formation of desirable compounds and products or in the transformation, or destruction of unwanted or toxic substances.

Course Code:	CHPE6600	Course Title:	Nanocomposite Engineering Materials
No. of credit hours:	3	No. of contact hours:	3

A short description:

The course is designed to cover the following topics: the nanotechnology, nanomaterials, synthesis of nanomaterials, applications of nanomaterials, sensors, polymeric nanocomposites materials, nanomaterials and nanofillers and to establish a foundation for further study and research in this area. Software for nanocomposite material design will be introduced and applied to material selection and analysis of simple nanocomposite structures.

Course Code:	CHPE6900	Course Title:	Special Topics
No. of credit hours:	3	No. of contact hours:	3

A short description:

Different advanced selected topics in Chemical Engineering to complement the student's program. The executive committee of the program should decide the topics to be offered each semester based on the needs.

Course Code:	CHPE6212	Course Title:	Directed Studies
No. of credit hours:	3	No. of contact hours:	3

A short description:

Directed Studies courses make it possible for one or more students to work under the guidance of a faculty member on a reading or research topic of mutual interest. Directed Studies courses are not to duplicate material covered in other department courses, and should contain a strong element of research. Ideally, the course should be based on some issues associated with a research topic.

Course Code:	CHPE7002	Course Title:	CHPE Master Thesis
No. of credit hours:	6	No. of contact hours:	

A short description:

The focus of the program is the undertaking of guided research combined with appropriate training. The supervisor will guide the candidate in the research project. The Candidate is required to conduct the necessary literature search, do the research, analyze the results, write the report and communicate the results at an oral defence. This work need no necessarily be original research, but will be a new application of ideas. The student preferably chooses the supervisor at the end of the first semester, but not later than the end of the second semester.

• PhD in Petroleum Engineering

Course Description

Course Code:	PNGE8001	Course Title:	Ph.D. Thesis
No. of credit hours:	0	No. of contact hours:	

A short description

Involves original research (theoretical/experimental) on a chosen problem within the field of Petroleum and Natural Gas Engineering. The overall result should be a scientific contribution adding to further knowledge in petroleum engineering.

• PhD in Chemical and Process Engineering

Course Description

Course Code:	CHPE8001	Course Title:	PhD Thesis
No. of credit hours:	0	No. of contact hours:	

A short description :

Involves original research (theoretical/ experimental) on a chosen problem within the field of Chemical Engineering. The overall result should be a scientific contribution adding to further knowledge in Chemical Engineering.

4.4.4 Labs and Workshops

The Department has well-equipped laboratories for both Petroleum and Natural Gas and Chemical & Process Engineering programs. They support teaching in all major facets of the programs. The facilities are used for both educational and research purposes. The instruments in the laboratories represent the latest advancement in the related fields.

The Department has the laboratories as listed below:

1. Core cutting and stone technology Laboratory
2. Petroleum Engineering Laboratory
3. Drilling Laboratory
4. Chemical Engineering Laboratory
5. Unit operation Laboratory
6. Process control
7. Reaction Engineering Laboratory
8. Formation Damage Laboratory
9. Multiphase Flow Laboratory
10. Green Engineering Laboratory
11. Biofuel Production Laboratory
12. Polymer EOR Laboratory
13. Chemical Analysis Laboratory
14. Reaction and Catalysis Laboratory
15. Simulation Laboratory



4.5 Mechatronics Engineering Program (MCE)

4.5.1 Program Overview

The College of Engineering started implementing the Mechatronics Engineering (MCE) program with the 2002 students' intake. The MCE program is jointly run by the Electrical and Computer Engineering (ECE) and Mechanical and Industrial Engineering (MIE) departments. The bachelor degree of Mechatronics Engineering (MCE) is designed to provide sound undergraduate education to integrate mechanical, electrical and computer engineering into a meaningful program so as to produce engineers that are conversant with all of the relevant technologies needed by the present and future industries of Oman. They engender broad awareness of social, cultural, and ethical issues together with good understanding of the role of engineering in the community. These traits lead to internationally recognized degrees.

Program Vision

The Mechatronics Engineering Program (MCE) is keen to continue as an outstanding national program of Mechatronics Engineering. Its Vision is to be recognized as innovative and leading program in high quality educational services.

Program Mission

The mission of the Mechatronics Engineering program (MCE) is to provide an outstanding education in Mechatronics Engineering with a rich diversity of skills, to contribute to the community prosperity through professional services and research, and to prepare graduates able to engage in life-long learning and capable of carrying out engineering practice with competence.

4.5.2 Steering Committee Members



Dr. Nasr Al-Hinai

Associate Professor, Chair

Research Interests: Production Planning and Control, Metaheuristics in Operations Research, Product Design and Development, Project Management, Analysis of Bio-Composites Development Processes



Dr. Ahmed Al-Maashri

Associate Professor, Co-Chair

Research Interests: AI, Unmanned Aerial Vehicles, Embedded Vision Systems, Hardware accelerators



Dr. Riadh Zaier

Associate Professor, Program Coordinator

Research Interests: Robotics and Automation, Mechatronics System Design, Bioinspired Control Methods, Legged Robotics



Dr. Faical Mnif

Associate Professor, Deputy Program Coordinator

Research Interests: Robotics, Control Theory and Applications, Autonomous Systems



Dr. Hassan Al-Lawati

Assistant Professor, Assistant Dean for Undergraduate Studies (ADUS)

Research Interests: Circularly Polarized Antennas, Dielectric Resonator Antennas, MIMO Antennas, Wearable Antennas, MIMO Antennas



Dr. Amur Al-Yahmedi

Associate Professor

Research Interests: Legged Robotics, Mobile robot navigation, Autonomous car navigation, Multibody Dynamics and Modeling & Simulation

ACADEMIC DEPARTMENTS

MECHATRONICS ENGINEERING



Dr. Muhammed Shafiq

Associate Professor

Research Interests: Intelligent control of mechatronic and robotic systems, Adaptive and robust control of nonlinear and chaotic systems, Neural network and machine learning-based control strategies, Control and modeling of soft actuators and rehabilitation robotics, Smart grid systems and energy-efficient technologies, VTOL (Vertical Take-Off and Landing) and omnidirectional mobile robot control, AI applications in industrial automation and environmental monitoring, AI-based medical cancer detection and classification systems assistance



Dr. Musaab Zarog

Assistant Professor

Research Interests: Microelectromechanical Systems (MEMS), Vibration-based Energy Harvesting, AI Predictive maintenance, Engineering Research Impact, Decision Making Application for Islamic Sciences



Dr. Mohamed Al-Lawati

Assistant Professor

Research Interests: Nonlinear control, UAVs, Robotics, Multi-agent systems



Dr. Ibrahim Al Naimi

Assistant Professor

Research Interests: Smart homes and energy managements, Modeling, identification, and real time control, Sensor technology and sensor fusion, Fault detection in 3-phase power systems, Robotics and AI, Human tracking and identification



Dr. Hussein Obeid

Assistant Professor

Research Interests: Robust & adaptive control and observer design, Machine learning & deep reinforcement learning, Energy storage systems (Li-ion batteries, fuel cells), Energy management optimization (EVs, microgrids), HIL & PHIL test benches, Control & observation of electromechanical systems



Engr. Nusiba Al-Kharusi

Engineer B

4.5.3 Course Description

Course Code	HIST1010	Course Title	Oman and Islamic Civilization
No. of Credit Hours	2	No. of Contact Hours:	2

A short description:

This course is a comprehensive survey of the role of Oman in Islamic civilization including an historical and geographical introduction to Oman before Islam; the efforts of the Omanis in spreading Islam; study of aspects of Islamic civilization, and Oman's role.

Course Code	ISLM1010	Course Title	Islamic Culture
No. of Credit Hours	2	No. of Contact Hours:	2

A short description:

This course aims at teaching students the main constituents of Islamic Culture. The course studies the concept of Islamic culture, its sources, characteristics and constituents. Moreover, it focuses on God, the Universe, human being, life etc.

Course Code	CHEM1071	Course Title	General Chemistry for Engineering
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

This is an introductory survey course designed to give engineers an appropriate background in chemistry. It includes topics such as atomic structure, bonding, states of matter, energy changes, reaction kinetics and equilibrations in solution, and the periodic table.

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MECHATRONICS ENGINEERING

Course Code	ENGR1501	Course Title	Introduction to Engineering
No. of Credit Hours	1	No. of Contact Hours:	4

A short description:

This course is a summary of all the engineering disciplines in which undergraduate engineering degrees are offered at the Sultan Qaboos University (College of Engineering). Students will be familiarized not only with the fundamentals of each discipline, but will also be enlightened by the experiences of engineering professionals in the industry. This would enable students to get a glimpse of each engineering discipline and will also give an idea of what to expect as an engineer once they graduate. There will be lectures and seminars on topics listed in this course outline.

Course Code	ENGR1600	Course Title	Workshop I
No. of Credit Hours	1	No. of Contact Hours:	2

A short description:

As well as giving an extensive grounding in theoretical aspects of engineering, the professional engineer needs to appreciate the methods by which things are made and to understand and respect the skills involved in these processes. An elementary knowledge of manufacturing techniques is an essential for many undergraduate courses, so that some workshop experience is now regarded as necessary before starting an engineering course or in the initial year of that course. This course gives a "hands on" element in the workshop environment.

Course Code	LANC2160	Course Title	English for Engineering I
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

The aim of upper intermediate course is to develop the study and language-related skills required by engineering students in order to deal with their academic studies. The course teaches the academic reading and writing skills associated with the most common language functions found in general scientific English, such as generalizing, describing, defining, classifying and hypothesizing.

Course Code	MATH2107	Course Title	Calculus I
No. of Credit Hours	4	No. of Contact Hours:	4

A short description:

This is the first standard calculus course of three. It presents practical and theoretical aspects related to: Limits and continuity, derivatives, functions (logarithmic, exponential, trigonometric, hyperbolic) and integration. The course also introduces Computer Algebra Systems CAS and their uses to the students.

Course Code	ARAB1060	Course Title	Arabic
No. of Credit Hours	2	No. of Contact Hours:	3

A short description:

This course is based on the study and analysis of a number of different poetic and prose texts in the various religious, national, scientific, legal, economic, linguistic, etc. fields identified in the approved university textbook. The course involves the study of the fundamentals of Arabic language in a manner that helps to understand and absorb texts, describe their aesthetic and critical properties, analyze linguistic structures- in form and composition, significance and style- to identify the most prominent linguistic and rhetorical styles along with knowledge of some morphological, grammatical and rhetorical aspects and written techniques (spelling and punctuation). The course aims to train students to deal with the texts and exercises contained in the approved textbook.

Course Code	SOCY1005	Course Title	Contemporary Omani State and People
No. of Credit Hours	2	No. of Contact Hours:	2

A short description:

The aim of the proposed course is to enhance students' awareness of identity, values of the Omani society, and to help students understand the role played by heritage, historical, demographic, cultural, and institutional variables in shaping and characterizing the Omani identity. The course also aims to shed light on the State's administrative system and the foundations of the Omani Renaissance and its indicators based on the thought of His Majesty Sultan Qaboos bin Said and his distinctive approach in building the nation and people.

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Course Code	LANC2161	Course Title	English for Engineering II
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

The aim of this advanced course is to further develop the study and language-related skills required by engineering students in order to deal with their academic studies. The course develops academic reading and writing skills at an intellectually challenging level. Classwork, group projects, and self-access assignments are included.

Course Code	MATH2109	Course Title	Calculus II for Science and Eng.
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This is the second course in a series of three Calculus courses. The course builds on the topics taught in Calculus I, and deals primarily with applications of integration such as calculating volumes, length of curves and surface areas, the techniques of integration of various functions, and proper and improper integrals. It also deals with sequences, series and their convergence, power series and their convergence as well as differentiating and integrating power series. The course ends with the introduction of polar coordinate system, polar curves and some basic polar calculus.

Course Code	PHYS2107	Course Title	Physics for Engineering I
No. of Credit Hours	4	No. of Contact Hours:	6

A short description:

An introductory course that develops a sound understanding of the basic physical principles underlying natural phenomena related to translational dynamics, rotational dynamics, statics and fluids using elementary calculus and experimental techniques. The emphasis is on developing an intuition for the behaviour of physical systems and problem solving.

Course Code	PHYS2108	Course Title	Physics for Engineering II
No. of Credit Hours	4	No. of Contact Hours:	6

A short description:

An introductory course that develops a sound understanding of the basic physical principles underlying natural phenomena related to electricity and magnetism and heat and thermodynamics using calculus and experimental techniques. The emphasis is on developing an intuition for the behaviour of physical systems and problem solving.

Course Code	COMP2002	Course Title	Introduction to Computer Program for Engineer
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course is intended to introduce the engineering students to software development using a high-level programming language. Course contents include: problem solving methodology, program structure, language syntax, variables, data types, control flow, functions, data files, arrays, and variable scope.

Course Code	ENGR2217	Course Title	Programming for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course is intended to develop students' computer skills in writing and implementing computer programs applied to engineering problem solving using high level programming language such as C or C++. The course contents target the following themes: computing basics, algorithmic thinking, program structures and applied programming for engineering problem solving.

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MECHATRONICS ENGINEERING

Course Code	ECCE2017	Course Title	Electric Circuit Analysis
No. of Credit Hours	4	No. of Contact Hours:	5

A short description:

This course deals with both DC and AC circuit analysis, using manual techniques as well as computer simulators (CAD Tools). It includes: Electrical quantities and terminology used in electrical engineering, Methods and theorems used in circuit analysis, Transient analysis of RC, RL and RLC circuits, Phasor concept, AC Steady-state response, Average power and RMS values, and Three-phase circuits.

Course Code	MEIE3103	Course Title	Engineering Tools and Graphics
No. of Credit Hours	2	No. of Contact Hours:	3

A short description:

This course introduces the fundamentals of computer/machine tools. The course will enable students to have practical skills in engineering drawing, basic programming and workshop practice. The course covers CAD and drafting, programming and basic machining operations. Topics include: Introduction to MATLAB/ LabVIEW; CAD drawing (2D & introduction to 3D modelling/assembly); Measurement tools; Machining, Drilling, Welding etc.; 3D printing and ideas for sheet metal working. Students will perform various hand and machine tool operations under staff supervision, and build and test a project.

Course Code	MATH3171	Course Title	Linear Algebra and Multivariate Calculus for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Many physical quantities have a vectorial representation, and vector analysis often simplifies calculations considerably. The current course introduces the student to vector algebra, matrices and determinants, vector differential calculus, line and surface integrals, and divergence theorems.

Course Code	MATH4174	Course Title	Differential Equations for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Differential Equations of the first order, linear differential equations, Laplace transformation, Fourier series, Fourier transforms and partial differential equations.

Course Code	MCTE2129	Course Title	Engineering Mechanics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course introduces the concepts of mechanics of rigid bodies. The course consists of two parts, statics and dynamics. In the statics part, the students are introduced to the concept of force, moment, resultant, free body diagram, equilibrium state and friction. In the dynamics part, the students are introduced to the concept of velocity, acceleration, inertia forces, centrifugal forces, and rigid body dynamics. Use of MATLAB as a tool to solve static and dynamic problems.

Course Code	MEIE3281	Course Title	Probability and Statistics for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course emphasizes on the role of probability and statistics in engineering. The course will cover data summary and presentations; Introduction to probability; Discrete and continuous probability distributions; Hypothesis testing; Curve fitting, regression and correlation; Introduction to statistical quality control. Also, the use of computer applications in statistical analysis is emphasized. The examples and exercises strongly focus on engineering applications.

Course Code	ECCE3206	Course Title	Digital Logic Design
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This is an introductory course in logic and digital design. Course topics cover number systems, Boolean algebra and logic gates, simplification of Boolean functions, combinational logic design, MSI and PLD components, sequential logic design, registers, counters, and the memory unit.

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Course Code	MCTE3250	Course Title	Engineering System Design
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

A project-based course that covers the product design process. Topics include: introduction to system/product design; CAD solid modelling of 3-D parts/products, multi-views, assembly drawings with dimensions/tolerances; identification of customer needs; product design specifications; concept generation, selection and testing; product architecture; idea of prototyping and intellectual property rights. Students work in teams on a course project work.

Course Code	MCTE3230	Course Title	Properties and Strengths of Materials
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course is aimed to provide an understanding and appreciation of properties and strength of materials used in engineering. In addition, the principles acquired in Basic Mechanics course will be extended to discuss stress and deformations and their applications in Mechatronics Engineering. Main topics are: introduction to materials, metals, polymers and smart materials, mechanical, electrical and thermal properties of materials, axial stress and strain, shear, torsion, beam stresses and deflections, combined axial and bending stress, columns, shear and moment diagrams, Mohr's circle introduction, thin-walled pressure vessels, working stresses and factors of safety, statically indeterminate problems.

Course Code	MCTE4185	Course Title	Signals and Systems for Mechatronics
No. of Credit Hours	3	No. of Contact Hours:	3

A short description:

Signals and systems characteristics and models. Systems defined by differential and difference equations, system modelling. Time and frequency-domain representation and analysis of continuous & discrete time signals and systems, Fourier series and Fourier transform, Laplace transform. Investigation of the above concepts using MATLAB.

Course Code	MCTE3310	Course Title	Electronics for Mechatronics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Solid State Diodes (PN, photodiode, LED, Solar Cell) with applications, principles of operation of BJTs and MOSFETs, Two-Port Networks, Analog circuits: Op-Amp theory, Basic Op-Amp Circuits, Op-Amp Parameters, Comparators and Schmitt Triggers, Digital-to-Analog Converters. Analog-to-Digital Converters, Power Supplies, Solid State Transducers. Voltage-Controlled Oscillators and Function Generators. CAD tools for circuit simulation and design.

Course Code	MEIE3122	Course Title	Machine Dynamics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course includes dynamic analysis and design of machines, kinematic analysis of mechanisms, cams, gears, force analysis, flywheels, balancing of machines- rotating and reciprocating unbalance, mechanical vibration, and case studies.

Course Code	MCTE4102	Course Title	Machine Design for Mechatronics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course deals with design of basic machine elements. The course is intended to present the fundamental theory of machine design and teach students how to design and analyze machine components. It utilizes the background of knowledge in mechanics of materials and properties of materials. It gives the student straightforward tools for stresses, strains and strengths analyses of machine components subjected to axial, shear, torsion, bending and combined loading. The course starts by introducing students to the various types of stresses and the different types of failure theories of static and cyclic loading conditions. The course will then cover Principles of mechanical design, Designs for different load types, Belt and chain drive, Gears, Linear motion elements, Motion control clutches and breaks. Emphasis is placed on selection of various mechanical components based on sound judgment and practice in design.

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Course Code	MCTE4145	Course Title	Instrumentation and Measurement
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course covers instrument static and dynamic characteristics, measurement errors, statistical evaluation of measurement data, standards and calibration of instruments. The course covers also signal conditioning and transmission. Furthermore, this course introduces the fundamentals of some common sensors, their working principles, and how to select them for a given application. This includes motion, force, torque, pressure, flow, temperature sensors and transducers.

Course Code	MCTE3210	Course Title	Electromechanical Systems and Actuators
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Magnetic circuits, principles of electromechanical energy conversion, actuators for mechatronics applications including relays, solenoids, DC motors, AC motors, special motors, hydraulics and pneumatics

Course Code	ECCE4227	Course Title	Embedded Systems
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This is an introductory course about microcontroller and its use in the design of embedded systems. Topics covered include hardware and software architectures of a microcontroller, assembly language programming for the microcontroller, and its application for a wide range of real-world applications.

Course Code	MCTE4150	Course Title	Modelling and Simulation
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The objective of this course is to provide the students with the "Bond Graph" methodology, utilized for the unified modelling, analysis and synthesis of engineering systems. This course will introduce students not only to the simple building blocks from which models (for hybrid systems) can be constructed, but also to the mindset with which a modelling challenge must be approached.

Course Code	MCTE4210	Course Title	Power Electro and Drives
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This is a basic course in power electronics and electrical drives. It covers power semiconductor devices and converters, speed/torque characteristics of motors and loads, operating point, multi- quadrant operation, DC and AC motors steady state modelling, speed control and braking, semiconductor-controlled DC and AC motor drives.

Course Code	MCTE4241	Course Title	Thermofluids
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course introduces basic concepts and laws of thermodynamics and fluid mechanics through a balanced handling of theory and engineering applications. Properties of pure substances, mass and energy transfer, first law of thermodynamics (closed and open systems), second law of thermodynamics (closed and open systems), basic concepts of fluid mechanics, Bernoulli equation and flow in pipes, head losses in pipes and pipe network. Students are expected to conduct experiments and write a report.

Course Code	MCTE4450	Course Title	Control Systems Engineering
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Fundamentals of feedback control with emphasis on classical and modern techniques and an introduction to discrete-time (computer controlled) systems. Topics include the following: review of input/output and input/state representations of dynamical systems; feedback control system concepts and components; control system performance specifications such as stability, transient response, and steady state error; analytical and graphical methods for analysis and design - root locus, Bode plot, Nyquist criterion, pole placement, LQR; design and implementation of proportional, proportional-derivative, proportional-integral-derivative, lead, lag, and lead-lag controllers. Introduction to digital controllers - synthesis, implementation, constraints. Widespread use of computer-aided tools for the analysis and the design of control systems.

ACADEMIC DEPARTMENTS

MECHATRONICS ENGINEERING

Course Code	ECCE5004	Course Title	Engineering Management and Economics (1)
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course focuses on introducing to the engineering students a variety of tools and techniques in management & economics that can be used to facilitate the optimum utilization of manpower, materials, machines, money, and other resources.

Course Code	MEIE4183	Course Title	Numerical Methods for Engineers
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course covers the basics of numerical methods for the solution of applied problems in engineering. Course emphasizes an understanding of the mathematics underlying the various numerical methods that have developed for solving linear and nonlinear problems and for approximating functions using polynomial approximations, splines and curve fitting. The course includes a treatment of numerical differentiation, numerical integration and an introduction to the computational solution of ordinary differential equations.

Course Code	ENGR4007	Course Title	Industrial Training
No. of Credit Hours	0	No. of Contact Hours:	-

A short description:

This training course provides an industrial or professional environment related to the field of specialization chosen by the student at the College of Engineering, providing the student with practical on-job training experience. The student in this course is assigned to an operational and professional industrial organization for a period of 8 weeks or more. In other cases, a very intensive training period of less than 8 weeks can be accepted. During this industrial training, the student acquires the necessary soft skills along with valuable professional experience needed for the labour market after graduation.

Course Code	MCTE5191	Course Title	Project (1)
No. of Credit Hours	2	No. of Contact Hours:	-

A short description:

Part I of the final year project which extends over two semesters. Topics will depend on student's and supervisor's interest. They may include data acquisition and interpretation, computer models and simulation or design and experimentation. Students are required to give a seminar to discuss the project results and submit a final report.

Course Code	MCTE5210	Course Title	Real-Time Control and Interfacing
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Real-time computer systems for the monitoring and control of laboratory and industrial processes are studied and implemented. Emphasis is on the Software Engineering of embedded systems with hard-real time constraints. Microcontrollers are interfaced with peripherals and used to control mechanical systems. Course work includes several small team projects focused on developing software and hardware for an embedded real-time system.

Course Code	MCTE4255	Course Title	Mechatronics System Design
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The objective of this course is to allow the students to understand the synergy between mechanical design, computer control and electronic components in arriving at a mechatronics system. Students will be provided with the needed knowledge and understanding of issues related to integrating mechanical, electronic and software components towards building mechatronic devices. Subjects such as actuators, sensors as well as electronics and hardware components for mechatronics will be discussed. The course is project and design oriented and the focus is placed on learning to work with real hardware to provide hands on working knowledge of real time programming, computer interfacing, mechanical design and fabrication and control system design.

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Course Code	MCTE5291	Course Title	Project (2)
No. of Credit Hours	3	No. of Contact Hours:	-

A short description:

Part II of the final year project which extends over two semesters. Topics will depend on student's and supervisor's interest. They may include data acquisition and interpretation, computer models and simulation or design and experimentation. Students are required to give a seminar to discuss the project results and submit a final report.

Course Code	MCTE5142	Course Title	Robotics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This is an introductory course in robotics with emphasis on the mathematical tools for kinematics and dynamics of robot arms. Topics include the geometry and mathematical representation of rigid body motion; forward and inverse kinematics of articulated mechanical arms; trajectory generation, interpolation; manipulator dynamics; and topics in manipulator control.

Course Code	MCTE5420	Course Title	Pneumatic and Hydraulic Systems
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Fundamentals of electro-hydraulic and electro-pneumatic control using different techniques and platforms. Topics includes: Basic components of hydraulic and pneumatic systems, hydraulic and pneumatic circuits and applications, basic electrical controls of fluid systems, fluid logic control systems, servo-hydraulic and servo-pneumatic systems, programmable logic controllers.

Major Electives

Course Code	MCTE5001	Course Title	Cooperative Training-I
No. of Credit Hours	0	No. of Contact Hours:	-

A short description:

Co-Operative Training courses are optional. These are designed for students who are following Scheme-I or Scheme-II and willing to take a one-year Co-Op program after finishing semester-8. Internal regulations apply.

Course Code	MCTE5002	Course Title	Cooperative Training-II
No. of Credit Hours	6	No. of Contact Hours:	-

A short description:

Co-Operative Training courses are optional. These are designed for students who are following Scheme-I or Scheme-II and willing to take a one-year Co-Op program after finishing semester-8. Internal regulations apply.

Course Code	MEIE5101	Course Title	Engineering Vibration
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The main objective of this course is to study the mechanisms of generation and transmission of machinery vibration. The flexibility of the mechanical components and damping mechanisms are taken into account in designing methods of reduction and isolation of vibration in machines. Main Topics: Physical effects of vibration and noise, international standards on limits of vibration and noise exposure, sources of vibration, Critical speeds of rotating shafts; Vibration of single degree of freedom systems -free and forced harmonic vibration - rotating unbalance, support motion, vibration isolation, structural damping; Two degree of freedom systems - free and forced vibration-undamped and damped, vibration absorber; Multi-DOF systems- flexibility matrix, stiffness matrix, eigenvalue problem-approximate methods of calculation; torsional systems; Vibration measurement and analysis- vibration measuring instruments-accelerometers, charge amplifiers, analysis of vibration signals - FFT analyzers, vibration testing, modal data extraction; case studies.

ACADEMIC DEPARTMENTS

MECHATRONICS ENGINEERING

Course Code	MEIE5131	Course Title	Legged Locomotion of Robots and Animals
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Introduction to the biomechanical analysis of terrestrial Locomotion based on the mechanical laws of motion. The course covers legged locomotion, as they apply to robots and animals. Topics include Passive Dynamics in Legged Locomotion, Spring like models and running, Raibert Hopping Robots, Energetic of Locomotion, Introduction to Control and Optimality in Locomotion, ZMP and Capture Point Method.

Course Code	MEIE5127	Course Title	Analysis and Design of Control Systems
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The aim of this course is to provide the student with a clear exposition of the basic principles of frequency-and-time analysis and control design with more emphasis on design for real world applications. The main topics are linear control systems analysis and design in transform domain and time domain, transfer functions and state equations, Frequency response and Nyquist stability, Loop shaping. State feedback controller and observer design, applications to mechanical and mechatronics systems and Computer control.

Course Code	MEIE5122	Course Title	Applied Multibody Dynamics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

The basic course in dynamics or Basic Mechanics often deals well with the dynamics of one rigid body. In this course, a systematic approach to the generation and solution of equations of motion for interconnected rigid bodies will be covered. The systems studied consists of multiple interconnected rigid bodies (Robots, beam pump, walking machines,) the so-called multibody systems. The course covers derivation of the equations of motion using Newton/Euler equations; angular momentum principle; Kane's method; and Lagrange's equations, with more focus on using Kane's method. It will also cover Numerical solutions of nonlinear algebraic and differential equations governing the behaviour of multiple degree of freedom systems; Symbolic and numerical computational methods; Computer simulation of multi-body dynamic systems using tools such as MATLAB, and the multibody dynamics analysis program AUTOLEV; Treatment of holonomic and nonholonomic constraints, the extraction of data from equations of motion, and computational issues.

Course Code	MEIE5146	Course Title	Renewable Energy
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course introduces through a balanced handling of theory of the fundamentals of renewable energy processes and engineering application of basic principles of renewable energy sources, such as solar energy and solar radiation, energy from the ocean, tides energy, geothermal energy, biogas production, photo voltaic, fuel cells, wind energy and fission and fusion reactions.

Course Code	MEIE5182	Course Title	Fundamentals of Biomechanics
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Biomechanics is the study of the structure and function of biological systems using principles of mechanics. This course is designed to build the concepts of the students to apply engineering knowledge to biological systems and analyzing them. The course integrates principles of engineering mechanics and anatomical components to evaluate forces and associated deformations in biological tissues. Kinematics and kinetics of the musculoskeletal systems will be discussed. Specific topics will include description of musculoskeletal system, analysis of forces in various joints and muscle groups, study of human walking and postures, measurements and analysis of stress and strain in biological tissues, energy and power in human activity. The course will provide opportunity for students to prepare themselves to attend graduate school in biomedical engineering, industrial positions in biotechnology and clinical research centres.

Course Code	MEIE5288	Course Title	Innovation and Entrepreneurship
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Innovation at its simple definition is the process of turning ideas into reality and capturing a value from them. In this course the student will learn how to innovate, create value which will eventually lead to start-up company. Finally, the student will learn how to manage resources i.e., money, people and equipment.

ACADEMIC DEPARTMENTS

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Course Code	MEIE5106	Course Title	Pressure Vessels and Piping System Design
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course includes introduction to axial, bending, shear stresses, stress-strain relations, equilibrium equations, failure criteria, stresses in pressure vessels, general design guidelines, design of vessels and piping supports, stresses in cylindrical shells, piping systems, storage tanks, introduction to equipment related to pressure vessels and piping, introduction to various standards such as ASME pressure vessels, ANSI, API, etc., case studies of typical engineering design problems.

Course Code	MEIE5110	Course Title	Applied Finite Element Methods
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

This course introduces students to the fundamental concepts of the finite element method (FEM), and how to use this powerful design and analysis tool to tackle common mechanical engineering problems. The first half of the course will cover the fundamentals of FEM. The second half will focus on the application of the method. The course emphasizes the various methods of FE modelling and includes practical case studies in which problems are solved and critically examined by means of available commercial software. Main Topics: Review of matrices, linear algebra, interpolation, numerical differentiation and numerical integration. Displacement based finite element formulation (1-D & 2-D), Isoperimetric elements, High order elements, Incompatible elements, Convergence, Solutions of equations, Post processing, Finite element Modelling, Application of FEM to static and dynamic problems.

Course Code	MEIE5162	Course Title	Corrosion Engineering
No. of Credit Hours	3	No. of Contact Hours:	4

A short description:

Corrosion engineering course provides the students with a fundamental understanding of corrosion through discussion of electrochemistry, the forms of corrosion, the method of testing, and protection techniques. The corrosion and related chemical properties in general are also introduced as a main topic in the course. The design implications of selecting materials for corrosion resistance are discussed too. Term papers, case studies and projects are used to enhance the students understanding and introduce them to the real problems in the field of engineering.

Course Code:	ECCE5433	Course Title:	Modern Control Systems
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

State space representation of dynamic systems. Linearization of nonlinear systems. Solutions of state space equations. Lyapunov stability analysis. Controllability and observability of linear systems. Pole placement technique design. Design of observers. Kalman filters. Introduction to the optimal design in control.

Course Code:	ECCE5453	Course Title	Mobile Robot Control
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

This course provides an introduction to robotic systems from a computational perspective. A robot is regarded as an intelligent computer that can use sensors and act on the world. We will consider the definitional problems in robotics and

look at how they are being solved in practice. Upon completion of the course, the students should be able to: 1- Learn algorithmic approaches, mathematical models and computational and motion control methods applicable to mobile robotic systems 2- Learn basic sensor systems related to state measurements, navigation and localization. 3- Learn different motion planning and navigation schemes related to mobile robots 4- Recognize and analyze the basic mechanical and electrical systems concerning robots' locomotion and manipulation 5- Analyze and design the basic mobile robotic systems.

Course Code:	ECCE4436	Course Title	Industrial Control System Design
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

This course is intended to put into practice the theoretical knowledge of the mathematical aspects of process control by converting this knowledge into practical understanding of industrial control aspects and problems. This course provides an advanced level emphasis on the control system components and its corresponding process diagrams, it also provides a degree of emphasis on internal calculation of control algorithms in digital computers including techniques for controller tuning and implementation, designing various control structures most often employed in industry (i.e, feedforward, cascade control, ratio control technique and Deadtime Compensation). The course carries out by providing introduction to fundamental aspects of system identification, i.e., estimating dynamic models from sampled (experimental/operating) data. The principles learned in this course can also provide a foundation for the general understanding of how traditional control algorithm can be programmed in an industrial Programmable Logic Controller (PLC) software using the IEC 1131.3 programming standard.

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Course Code:	ECCE5008	Course Title	Project Management
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

Management methods and techniques of projects in Government and private sector organizations. Introduction to project development. Phases of project planning and management. Budgeting and cost estimation. Resource allocation. Organizing, staffing and directing, Project management techniques. Project controlling and monitoring. Cost management. Risk analysis. Quality management.

Course Code:	ECCE5223	Course Title	Advanced Embedded Systems Design
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

This is an advanced course on the design of embedded systems for various real-world applications in a real-time operating system (RTOS) environment using variety of software and C/C++ programming languages. Applications studied include digital signal processing, industrial automation and control, computer networking, and consumer devices.

Course Code:	ECCE5445	Course Title	Control Systems Design
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

State space representation of dynamic system . Linearization of nonlinear systems. Solutions f state space equations. Controllability and observability. Pole placement design technique. Design of observers. Introduction to the optimal design in control. Review of frequency domain analysis. Nyquist criteria for Stability and relative stability. Design of compensators is the frequency domain. case studies.

Course Code:	ECCE5432	Course Title	Programmable Logic Controllers
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

Control system components modelling and design of sequential controls, review of sensors and actuators of interest, Programmable Logic Controllers (PLCs): principles, interfacing and programming, programmable controller's communication and networking, user interface, process monitoring and visualization, supervisory (SCADA).

Course Code:	ECCE4253	Course Title	Object Oriented Programming
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

This course provides necessary high-level skills and knowledge to develop modern Windows-based applications using object-oriented concept of programming. At the end of the course, students will be aware of software development tools and technologies, be able to write solid event-driven code using Visual Basic; create stand-alone, multifunction applications and create effective interfaces.

Course Code:	ECCE4255	Course Title	Applied Programming and Algorithms for Engineers
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

Fundamental concepts in data structure and algorithms applied to engineering problem solving. The course covers some essential data structure topics such as lists, stack and trees as well as basic algorithms such as sorting, searching, matching and few graph algorithms (e.g. shortest path). In lab sessions, the above topics are deployed in solving engineering problems for efficient implementation in C, C++ or JAVA.

Course Code:	ECCE5443	Course Title	Optimization Techniques in Engineering
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

Linear programming. Simplex method. Duality theory. Network flow problems. Elements of integer programming. Nonlinear programming. A brief overview of interior point methods and global optimization techniques.

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Course Code:	ECCE5229	Course Title	Embedded Real Time Systems
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

This is an advanced course in the development of embedded systems; targeting multiple real-life applications. Applications include industrial automation and control, consumer electronics devices, computer networking, digital signal processing, etc. Through these applications, students will be exposed to different concepts such as Internet of Things and Embedded Operating Systems (e.g. Real-Time Operating System (RTOS) and Embedded Linux). Students will learn how to translate real world problems into engineering requirements with specific and realistic constraints and then prototype them onto embedded platforms.

Course Code:	ECCE5293	Course Title	Embedded Vision Systems
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

The course introduces the basics of embedded vision systems and its application domains. Basics of image processing and computer vision are covered. Machine vision algorithms and technologies. Embedded Systems and optimizations. Mapping machine vision to reconfigurable computing.

Course Code:	ECCE4216	Course Title	Machine Learning for Engineers
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

This course investigates machine-learning algorithms and utilizes them in solutions of real-world engineering applications. It employs scientific principles, and the development of machine learning tools in the solutions of real-life, engineering problems. Learning approaches that include supervised and unsupervised methods are studied to come up with a well-suited solution to several engineering case studies.

Course Code:	ECCE5219	Course Title	Intelligent Applications in Robotics & Drones
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

It is widely predicted that Robots and Drones will have a more visible role in our daily lives in the next decade. This course discusses several applications that blend Robotics and Drones with Artificial Intelligence. Students will be introduced to the basics of Robotics and Drones. Case studies will be explored in application domains such as industrial automation, precision agriculture, security, logistics, etc. Students will learn and develop algorithms that automate Robots and Drones and operate on data harvested by them.

Course Code:	ECCE5231	Course Title	Industrial Networks and Operating Systems
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

The first part of the course provides an introduction to operating system functions, Processes, CPU scheduling, single/multiuser OS, networking OS, and aspects of Linux OS as a case study. The course introduces fundamental concepts in the design and implementation of computer and industrial communication networks and their protocols. This includes introduction to OSI reference model, TCP/IP network protocol suite, HTTP, SMTP, FTP, DNS, TCP, UDP, IP, industrial network architecture, physical and logical characteristics of industrial networks, Ethernet and fieldbus technologies, common industrial protocol, and precision time protocol.

Course Code	MCTE5103	Course Title	Selected Topics in Control and Robotics
No. of Credit Hours	3	No. of Contact hours:	4

A short description:

This course covers topics of current interest in control systems design and analysis for mechanical and robotic systems. The subject matter of this course will vary from one offering to another. This may include adaptive control designs to address uncertainties and model inaccuracies, nonlinearities. Topics may also include intelligent controls, identification, etc.

ACADEMIC DEPARTMENTS

MECHATRONICS ENGINEERING

Course Code:	MATH2108	Course Title:	Calculus II
No. of Credit hours	3	No. of Contact hours:	4

A short description:

This is the second course in a series of three Calculus courses. The course builds on the topics taught in Calculus I, and deals primarily with applications of integration such as calculating volumes, length of curves and surface areas, the techniques of integration of various functions, and proper and improper integrals. It also deals with sequences, series and their convergence, power series and their convergence as well as differentiating and integrating power series. The course ends with the introduction of polar coordinate system, polar curves and some basic polar calculus. Relevant Theorems with their proofs will be emphasized.

Course Code	ECCE2016	Course Title:	Circuit Analysis I
No. of Credit hours	3	No. of Contact hours:	4

A short description:

Electrical quantities and terminology used in electrical engineering. Methods and theorems used in DC analysis. DC and transient analysis of R, RC and RL circuits both manually and with SPICE simulator.

Course Code	MEIE3107	Course Title	Eng. Drawing & Comp. Graphics
No. of Credit hours	3	No. of Contact hours:	4

A short description:

Engineering drawing is the technical language of engineers and technicians in academic or industrial settings. This course provides introduction to the theory and standards of technical drawings, computer aided solid modelling. The course covers theory of technical drawing and modelling of two and three-dimensional objects. Topics covering in the theory are: conventions and standards of engineering drawing, sketching techniques, theory of projections, rules of dimensioning, auxiliary views, isometric views, pictorial views and tolerancing. The course extensively covers two and three-dimensional geometric modelling using latest CAD programs. Student will learn how to create solid models of parts and assemble them through several tutorial sessions. Modifying geometry, dimensioning, storing and retrieving predefined shapes, generating multiviews, designing and manipulating drawing sheets are also taught.

Course Code	ECCE3016	Course Title:	Circuit Analysis II
No. of Credit hours	3	No. of Contact hours:	4

A short description:

This is the second part of a two-semester course in circuit analysis. The topics covered in this course deal with sinusoids, phasor concept, steady-state response, average power and RMS values, magnetically coupled circuits, three-phase circuits, complex frequency, resonance, and two-port networks.

Course Code	MEIE2129	Course Title	Basic Mechanics
No. of Credit hours	3	No. of Contact hours:	4

A short description:

This course introduces to the basic mechanics of particles and rigid bodies. The course consists of two parts, statics and dynamics. In the statics part, the students are introduced to the concept of force, moment, resultant, free body diagram, equilibrium state and friction. In the dynamics part, the students are introduced to the concept of velocity, acceleration, inertia forces, centrifugal forces, particle and rigid body dynamics.

Course Code	MCTE3110	Course Title	Electronics
No. of Credit hours	4	No. of Contact hours:	5

A short description:

Topics cover: Introduction to PN junction diode, Analysis and design of diode circuits, The Bipolar junction transistor (BJT), Analysis and design of BJT amplifier circuits, Field effect transistors, Analysis and design of FET amplifiers and circuits, Operational amplifiers and their applications, Filters and oscillators, Optoelectronic devices and circuits, Computer Aided design and simulation of electronic circuits.

Course Code	MCTE4230	Course Title	Thermal Sciences
No. of Credit hours	3	No. of Contact hours:	4

A short description:

This course introduces the fundamental concepts of thermodynamics and heat transfer together through a balanced handling of theory and engineering applications. The thermodynamics part of this course covers the basics of properties of pure substances, energy transfer, and first and second laws of thermodynamics. On the other hand, the essential mechanisms of heat transfer (conduction, convection, and radiation) are presented in the second part of this course.

ACADEMIC DEPARTMENTS

MECHATRONICS ENGINEERING

Course Code:	MEIE4102	Course Title	Machine Design 1
No. of Credit hours	3	No. of Contact hours:	4

A short description:

This course deals with design of basic machine elements. The course is intended to present the fundamental theory of machine design and teach students how to design and analyze machine components. It utilizes the background of knowledge in mechanics of materials and properties of materials. It gives the student straightforward tools for stresses, strains and strengths analyses of machine components subjected to axial, torsional, bending and combined loading. The course starts by introducing students to the various types of stresses and the different types of failure theories of static and cyclic loading conditions. The course will then cover the various methods of designing different machine components such as springs, shafts, gears, screws and bearings using appropriate fundamentals and failure theories. The domains of applicability of the course fundamentals in a wide range of engineering applications are also discussed. Emphasis is placed on design and not simply on problem solving or analysis. This course is designed to develop sound judgment and practice in design.

Course Code	MCTE3240	Course Title:	Engineering System Design
No. of Credit hours	2	No. of Contact hours:	3

A short description:

In this course the students will be introduced to engineering design process. Topics include: introduction to engineering system design, customer requirements analysis, translation of customer requirements to system requirements/specifications, conceptual design, concept selection and testing methods, system synergistic design including detailed design of mechanical, electrical, electronics, and software subsystems, simulation and prototyping.

Course Code	MEIE4141	Course Title	Fluids Mechanics
No. of Credit hours	3	No. of Contact hours:	4

A short description:

This course covers the fundamental principles of fluid mechanics: fluid properties, fluid statics and kinematics, governing laws related to fluid flow (continuity, momentum and energy equations) and their applications, dimensional analysis, concept of laminar and turbulent flows, flow in pipe, drag and lift forces for simple bodies, introduction to compressible flows.

4.5.4 Labs and Workshops

1. Mechatronics Lab

The Mechatronics Lab is specifically designed for the needs of Mechatronics Program students. This Lab contains several experimental setups and demo kits relevant to Robotics and Mechatronics applications, such as NI Robotics Starter Kit, Rotary Inverted Pendulum Trainer and Mechatronics Sensor Trainer, along with numerous measurement devices and setups. The Mechatronics Lab is well equipped with necessary computing capabilities with the required up to date software and internet access. The Lab is currently being used by Mechatronics Engineering, Electrical & Computer Engineering and Mechanical & Industrial Engineering program students in their relevant courses or for research activities. This Lab serves courses such as MCTE4145-Instrumentation & Measurement, MCTE5142-Robotics, MCTE4255-Mechatronics System Design and relevant projects.

2. Automatic Control Lab

3. CIM Lab

4. Circuits & Electronics Laboratory

5. Digital Laboratory

6. Computer Aided Mechanical and Industrial Engineering Laboratory (CAMIE)

7. The Electric Machines, Power Electronics and Drives Laboratory

8. The PCB Laboratory

9. Fluid Mechanics Lab

10. Thermodynamics Lab

11. Properties of Materials Lab

12. Mechanical Systems Lab

13. Solid Mechanics Laboratory

14. Metrology Lab



5

**ADMISSION
INFORMATION**



5.1 Undergraduate Programmes

5.1.1 Admission Requirements

1. General Education Diploma and Equivalencies

- Achieve a minimum overall score of 75% in the General Education Diploma.
- Must have studied and passed Advanced Mathematics, Chemistry, Physics, and Core English Language.
- Score a minimum of 65% in each of these required subjects.

2. (A-LEVEL) Certificates

- Must study at least two subjects from A-Level that are required for the major.
- Required subjects: Mathematics, Chemistry, and Physics.
- Must score a minimum of C grade in A-Level or a minimum of B grade in AS-Level in these subjects.

3. International Baccalaureate Diploma (IBD)

- Achieve at least 24 points out of a total of 45 points.
- Major subjects must be selected from both High Level (HL) and Standard Level (SL).
- Required subjects: Chemistry, Physics, Mathematics (Analysis and Approaches).
- Score a minimum of 4 points in HL or 5 points in SL.

4. International Baccalaureate Certificate (IBC)

- Achieve at least 30 points out of a total of 45 points.
- Major subjects must be selected from both High Level (HL) and Standard Level (SL).
- Required subjects: Chemistry, Physics, Mathematics (Analysis and Approaches).
- Score a minimum of 4 points in HL or 5 points in SL.

For more details, please visit:

<https://www.squ.edu.om/Portals/26/SQU-Admission%20Criteria.pdf?ver=en-3h9QcRYpcKKApVzy0sg%3d%3d>

5.1.2 Graduation Requirements

The graduation requirements are available on page 56 of The Academic Regulation Handbook:

<https://www.squ.edu.om/Portals/26/PDF%20files/Admission%20files/undergraduate%20academic%20R%2028-10-2018.pdf?ver=2020-06-23-100143-790>

5.2 Postgraduate Programmes

5.2.1 Admission Requirements

• Admission Requirements for MSc

1. Applicant should have a Bachelor's degree in relevant field from Sultan Qaboos.
2. University or from any other recognized university, with Cumulative Grade Point Average of not less than 2.75 on a 4 point scale, or Two year's Work experience is a must for candidates with Cumulative Grade Point Average between 2.5 and 2.74 in the Bachelor degree.
3. Applicants who have bachelor degree from a recognized institution and a postgraduate diploma in a related specialization from a recognized institution of higher education with a minimum cumulative GPA of 3.00 on a 4-point scale or its equivalent.
4. Candidates from other disciplines may be asked to attend additional bridging courses before starting the program.
5. Applicants must submit a release letter or a study leave from their employer for full time study or no objection letter for part-time study, addressed to the dean of postgraduate studies at SQU. Un-employed applicant needs to submit a statement from The Ministry of Labor documenting the unemployment status of the applicant.

• Admission Requirements for PhD

1. Applicants should have a Bachelor and a Master in a related engineering subject from Sultan Qaboos University or from any other recognized university.
2. A Master Cumulative Grade Point Average of not less than 3.00 on a 4-point scale or equivalent in any other system and the Deanship of Postgraduate studies makes the assessment for equivalency acceptance.

3. A Master cumulative GPA ranging between 2.75 and 2.99 on a 4-point scale or its equivalent, taking into account the applicant's work experience and any academic activities they are engaged in.
4. Two letters of reference from academics, to show competence in the discipline of interest and research capabilities.
5. Applicants should submit a statement of intent outlining and goals of the research proposed.
6. Applicants must submit a release letter or a study leave from their employer, addressed to the dean of postgraduate studies at SQU. Un-employed applicant needs to submit a statement from The Ministry of Labour documenting the unemployment status of the applicant.

5.2.2 Graduation Requirements

- *Program Requirement:*

Please complete all program requirements as per Postgraduate Academic Regulations item 16.

- *Submitting Approved Thesis:*

Submit the final approved version of the thesis along with the required soft and hard copies.

- *Thesis Formatting:*

Follow the general thesis format guideline, and send your thesis through the following emails:

naeemah@squ.edu.om (or) alsheryani@squ.edu.om

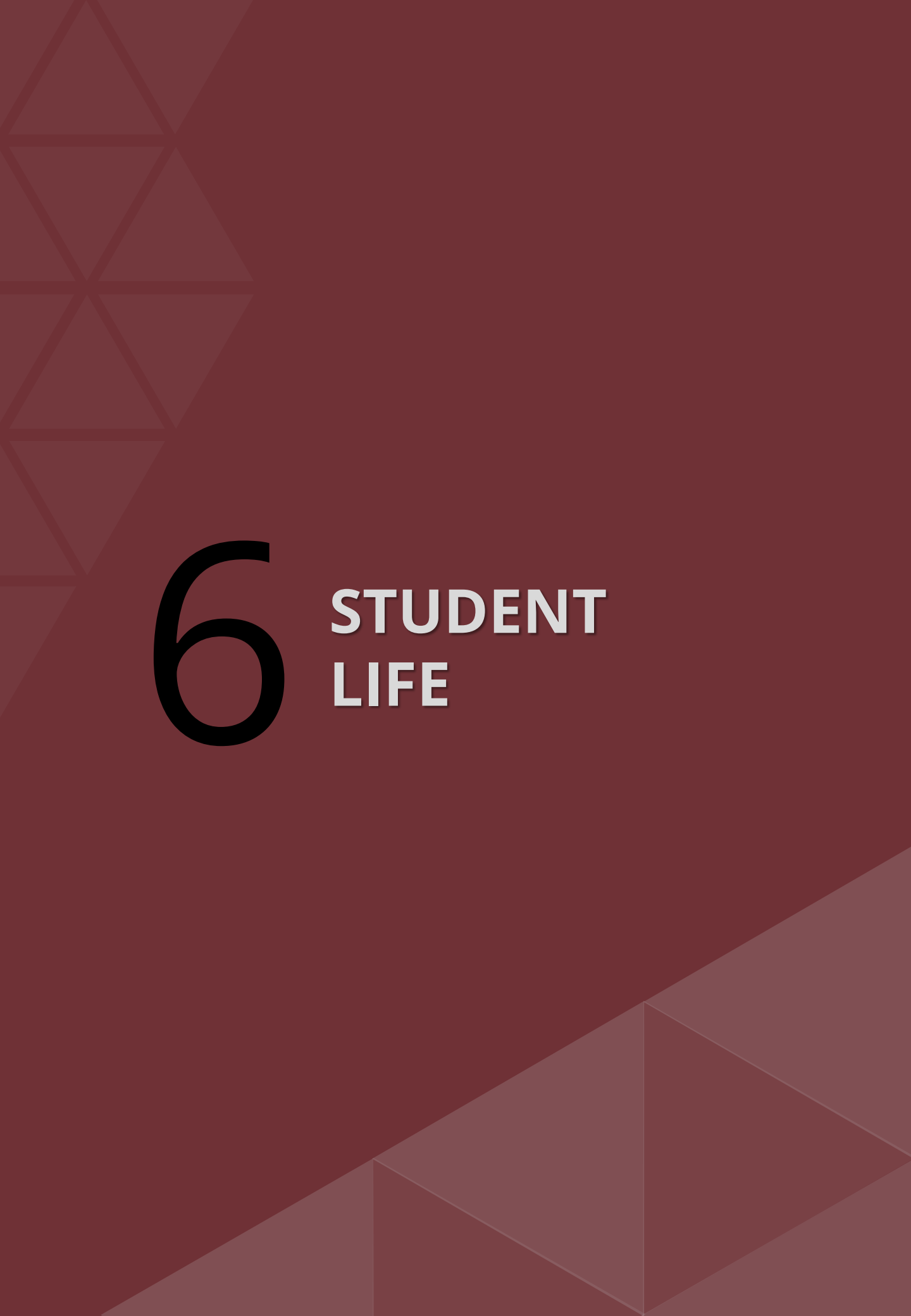
- *Received Degree Notification:*

Receive your Completion of Degree Notification from DPS.

- *Clearance:*

Obtaining clearance of all debts to the university.





6

**STUDENT
LIFE**



6.1 Academic Calendar

- *Undergraduate Calendar*

The Undergraduate Calendar is available at:

<https://www.squ.edu.om/Portals/26/Academic%20calendar/Academic%20Calendar-2025-2026-English.pdf?ver=ZO8wdn1zE1NYnl3CZGe9eA%3d%3d>

- *Postgraduate Calendar*

The Postgraduate Calendar is available at:

<https://www.squ.edu.om/Portals/42/Academic%20Calendar/Academic%20Calendar.pdf?ver=7l2E-ke5pwu08TXAa1DsjA%3d%3d>

6.2 Academic Policies

- *Undergraduate Academic Regulations*

The Undergraduate Academic Regulations are available at:

<https://www.squ.edu.om/Portals/26/PDF%20files/Admission%20files/undergraduate%20academic%20R%2028-10-2018.pdf?ver=2020-06-23-100143-790>

- *Postgraduate Academic Regulations*

The Postgraduate Academic Regulations are available at:

<https://www.squ.edu.om/LinkClick.aspx?fileticket=tbqRvtpuNUo%3d&portalid=42&language=en-US>

6.3 Academic Advising and Support

List of Advisors for Pre-Specialization Academic Advising Unit for the academic year 2023-2024:



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6.4 Students' Societies

Engineering Society is a student-run organization that aims, with the support and supervision of the College of Engineering, to provide students with opportunities to learn, promote 21st century skills, and share their experiences and knowledge to develop academically, socially, and professionally. The society organizes and hosts events such as seminars, conferences, exhibitions, and workshops. It is the ultimate goal of the Society and University to promote research, industrial collaboration, and innovation in Oman and prepare individuals to become contributing members of the community and the world.

The Engineering Society is an umbrella body in the college-level that works closely with the seven engineering societies (listed below), within the college of engineering at Sultan Qaboos University. Since its establishment in the academic year 2000-2001, the Engineering Society has successfully organized six Engineering Exhibitions and six Engineering Gatherings.

1. Society of Mechanical Engineers (SME)
2. Industrial Engineering Society (IES)
3. Society of Petroleum Engineers (SPE)
4. Society of Chemical Engineers (SCHEME)
5. Society of Mechatronics Engineers (MCTE)
6. Society of Electrical and Computer Engineers (IEEE Student Branch at SQU)
7. Civil & Architectural Engineering Society (CAES)

6.5 Alumni Relations

The College of Engineering at Sultan Qaboos University actively invites its alumni to contribute to the growth and development of current students through specialized workshops, mentorship sessions, and student-oriented activities. Alumni who have gained valuable experience in various engineering fields are regularly invited to deliver technical workshops, career talks, and training sessions that link classroom learning with real-world industry applications. Beyond student engagement, many alumni also play an important role in curriculum development and program enhancement by providing feedback on the relevance of course content to current engineering practices and market needs. Their input helps ensure that the College's academic programs remain aligned with professional standards and emerging technologies. Through these initiatives, alumni serve as vital partners in advancing the College's mission to prepare competent, industry-ready graduates and to strengthen collaboration between academia and the engineering profession.

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