



# **ABU DHABI POLYTECHNIC**

## **ACADEMIC SUPPORT DEPARTMENT**

General Catalogue

2019-2020

## **Engineering Fundamentals (ENG)**

### **ENG-113 Engineering Drawing (2 CR)**

This course will introduce students to engineering drawings, diagrams and schematics that are used in various industries. Students will learn how to read, interpret and decipher the various graphic symbols, components, systems, and abbreviations found on various engineering drawings categories; Fluid Power Diagrams and Schematics, Process and Instrumentation Diagram (P&ID) and loop diagrams, Electrical / Electronic diagrams and schematics, Logic Circuits and Diagram and Engineering Fabrication Drawings. In addition to that, students will learn how to use Auto-Computer –Aided Design (AutoCAD) software in engineering drawings.

Lecture 1 hr/wk, 2 lab 2hrs/wk

### **ENG-114 Industrial Safety and Professional Ethics (2 CR)**

This course is a study of safety and health management in the workplace as it related to hazard identification and control, accident investigation and prevention, emergency planning and moral responsibilities to society. It introduces the students to profession, professional ethics, various moral issues and uses of ethical theories, and codes of ethics in professional engineering societies.

Lecture 2 hrs/wk,

### **ENG-120P Mechanical Workshop (1 CR)**

This course is a hands-on course covering mechanical shop safety procedures and use of manual and automated mechanical machining processes. It provides the student with skills and knowledge of hand tools, drill presses, mills, lathes, welding and precision measuring instruments.

3 hrs Lab/wk,

### **ENG-126 Thermodynamics (3 CR)**

This course covers thermodynamics units, important thermodynamics properties, application of thermodynamics to flow systems (steam engines, turbines), and volumetric properties of pure fluids.

Lecture 2 hrs/wk, 2 Tutorial, 2hrs lab/wk

Pre-requisite: MATH111 or MATH103; PHYS 111, PHYS111P, CHEM111, CHEM111P

### **ENG-125 Introduction to Computer Electronics**

Electronics is an integral part of computers; hence students of computer engineering and information technology need to know the fundamental of analog and digital electronics circuits. This course has been designed to provide the needful inputs to handle simple electronic components and circuits. Students after studying this course will be able to understand the basics of analog and digital electronics, various electronics components, and develop skills to use simple electronic instruments needed for computer-based working environment. The student will become familiar with the use of computer design aids software for electronics such as PSPICE and to learn to use it to assist them in the analysis of circuits. By using PSPICE, the students will be able to design and draw circuits, simulate circuits, and analyze the simulation results.

Lecture 2 hrs/wk, 2 Tutorial, 2hrs lab/wk

Pre-requisite: MATH111 or MATH103; PHYS 112, PHYS112P

### **ENG-224 Statics and Strength of Materials (3 CR)**

This course is to develop knowledge and understanding of the principles and laws that relate to material strengths, stress and strain concepts, loading on materials, deflection of beams and shafts, and statically indeterminate beams and shafts.

Lecture 2 hrs/wk, 2 Tutorial, 2hrs lab/wk

Pre-requisite: MATH111 or MATH103; PHYS 112, PHYS112P

### **ENG-227 Fluid Flow and Heat Transfer (3 CR)**

The course explores introductory concepts of fluid mechanics and fluid statics. Also, the course covers mechanisms of heat transfer by conduction, convection, and radiation. It also introduces heat exchanger design and sizing.

Lecture 2 hrs/wk, 2 Tutorial, 2hrs lab wk

Pre-requisite: MATH111 or MATH103

## **Information Technology**

### **ICT-110 Introduction to Programming and Problem Solving (3 CR)**

This introductory course in engineering problem solving and computer programming is for all undergraduate engineering students without prior programming experience in any language. The course covers the fundamentals of computer programming and its underlying principles using the Java programming language. Concepts and methods are illustrated by examples from various engineering disciplines. Useful numerical techniques and their applications to real world problems in science and engineering are also discussed. Weekly laboratory required.

Lecture 2 hrs/wk, 2Lab 2hrs/wk

## **ENGLISH**

### **ENGL-120 English Skills (0 CR)**

This course focuses on the development of fundamental English communication skills most needed for students preparing for further studies. The overall objective of this course is to equip learners with the fundamental writing, reading, communication and critical thinking skills most relevant for further studies. These include active participation and engagement in real-life learning scenarios, the ability to generate and develop ideas in speaking and writing, and showing understanding of extended spoken and written texts through summary and synthesis.

Lecture 1 hrs/wk, 2 Tutorial hrs/wk

Co-requisite: ENGL121, ENGL121P

### **ENGL-121 Academic English I (3 CR)**

This course focuses on the development of intermediate English communication skills most needed for students preparing for further studies. The overall objective of this course is to equip learners with the skills of meaningful engagement with written and spoken discourses in academic and real-life contexts. These include critical evaluation of information in various texts, paraphrasing and synthesizing information, engagement in spontaneous conversations on academic topics, development and delivery of a focused and structured presentation, and development of focused and structured written texts.

Lecture 3 hrs/wk,

Pre-requisite: ENGL120 or IELTS (6.0 with all bands 5.5 or above) or EmSAT (1300)

### **ENGL-121P Academic English I Practical (0 CR)**

This is the practical application of skills taught in ENGL121.

Lab 2 hrs/wk

Pre-requisite: ENGL120 or IELTS (6.0 with all bands 5.5 or above) or EmSAT (1300)

Co-requisite: ENGL120; ENGL121

### **ENGL-122 Academic English II (3 CR)**

This course focuses on the development of high-intermediate English communication skills most needed for students preparing for further studies. The overall objective of this course is to equip learners with the skills to independently navigate information and use it to evaluate and produce oral and written texts in a variety of contexts. These include identification and selection of relevant information from sources, integration of evidence in writing and speaking, use of a referencing style, and interpretation of graphic and other visual data.

Lecture 3 hrs/wk,

Pre-requisite: ENGL121 or IELTS (6.5 with all bands 6.0 or above) or EmSAT (1500)

Co-requisite: ENGL122P

### **ENGL-122P Academic English II Practical (0 CR)**

This is the practical application of skills taught in ENGL121.

Lab 2 hrs/wk

Pre-requisite: ENGL121 & ENGL121P or IELTS (6.0 with all bands 5.5 or above) or EmSAT (1300)

Co-requisite: ENGL122

**ENGL-211 Public Speaking (1 CR)**

This course prepares students for situations where public speaking is required. Through a blended approach to learning, this course will help students practice and develop effective communication skills to compose and present speeches appropriate to various audiences, purposes and occasions. Topics will also include ethical responsibilities when speaking to others, overcoming fear, vocal aspects of speech delivery, nonverbal communications, and using appropriate visual aids.

Lecture 1 hr/wk, 1 online lecture hr/wk, Tutorial 1 hr/wk

Pre-requisite: ENGL122 & 122P

**ENGL-212 Literature Review (1 CR)**

Through a blended approach to learning, this course focuses on the skills that students need to locate, identify, and select relevant sources of literature to compile an annotated bibliography and a structured literature review.

Lecture 1 hr/wk, 1 online lecture hr/wk, Tutorial 1 hr/wk

Pre-requisite: ENGL211

**ENGL-213 Report Writing (1 CR)**

This course enables learners to refine their writing skills in the genre of report writing through a blended learning approach. Students will learn about key principles of report writing through a mixture of online lectures and in-class tutorials and workshops.

Lecture 1 hr/wk, 1 online lecture hr/wk, Tutorial 1 hr/wk

Pre-requisite: ENGL211

 **Humanities (HUM)****HUM-111 Islamic Culture (3 CR)**

This Islamic culture course deals with the foundation of Islam and its current challenges. Various lectures look at general Islamic regulations and the main issues related to Islamic civilization. Important intellectual issues in religion, Sharia law, worship, ethics and contemporary ideologies are addressed while focusing primarily on aspects of Islamic civilization, its effects and contributions to knowledge and science which have had a clear impact on the rebirth and progress of mankind. The course highlights the problems and challenges facing humanity in general, and Arabic and Islamic nations in particular. Moreover, it discusses the issue of how Islamic nations keep pace with modernity, and how to live and communicate with other cultures in harmony.

Lecture 3 hrs/wk

**HUM-112 Emirates Culture and Society (3 CR)**

This course is a study of human societies in general, and in particular the general features and main ingredients of the UAE society, geographic location, population development and composition, and economic and geographic aspects. It deals with family and tribal systems and the nature of governance in a tribal society. The nature of services provided to the community before and after the introduction of oil will be discussed, plus the role of cultural, educational and media institutions and the services they contribute to the community. Students will also be provided with a comprehensive and integrated understanding of UAE society and various aspects of social and economic life, political and cultural rights, with particular reference to modern society-building since the establishment of the Union and foreseeing the future. This course aims to strengthen the sense of national belonging, loyalty and pride through consolidation of national culture and social concepts, by student participation in a research project during the semester covering all topics associated with the course

Lecture 3 hrs/wk

**HUM-211 Arabic Communication Skills (3 CR)**

The communication process of the Arabic language is essential in everyday life, and, based on it, we build our decisions on an individual, collective and international level. This course aims to develop students' capabilities in listening, reading, writing and speaking in their native language. It also helps students to gain linguistic abilities to communicate professionally and socially. In addition, it trains students in different communication skills to avoid common mistakes that can arise from miscommunication. Linguistic performance is developed through a solid and clear understanding of the meanings of different types of texts, which are relevant to the students' environment. Students will navigate through a variety of texts from the Quran, poetry, prose and short stories.

Lecture 3 hrs/wk

## Mathematics

### **MATH-100 Precalculus (4 CR)**

This course covers basic algebraic operations on numbers, exponents, roots and radicals, equations, inequalities, scientific notations, algebraic operations on expressions, solving formulas and literal equations. It also covers geometry, functions and its graphs, solving system of linear equations and quadratics equations algebraically and graphically, matrix and its determinant, solving linear equations using the determinant (Cramer's rule), factoring and fractions, exponents and radicals, solving logarithmic and exponential equations, trigonometry, radian measure, vectors and oblique triangles, law of sines and law of cosine, plotting trigonometric functions.

Lecture 4 hrs/wk, Tutorial 1 hrs /wk

### **MATH-111 Calculus I (3 CR)**

This course is an introduction to single variable calculus. Topics include: limits and continuity, derivatives of algebraic, trigonometric, exponential, logarithmic and transcendental functions, implicit differentiation, techniques of differentiation and applications of the derivative in optimization, engineering applications and sketching graphs, L'Hospital rule, the concept of antiderivative and integral, definite and indefinite integrals, fundamental theorem of calculus, simple integration techniques, applications of integration in engineering and geometry.

Lecture 3 hrs

Pre-requisite: MATH100

### **MATH-112 Calculus II (3 CR)**

This course is a continuation of Calculus 1, topics include: Advanced methods of integration using substitution, by parts, or by partial fractions, improper integrals, applications of integration in engineering, infinite sequences, series, power series, the approximation of functions by power series, polar and parametric equations and curves, complex numbers and its forms, functions of two variables, partial derivatives, double integrals

Lecture 3 hrs/wk

Pre-requisite: MATH111

### **MATH-211 Linear Algebra (3CH)**

The course covers: Systems of linear equations, matrices, algebraic properties of matrix operations, Echelon form of a matrix, solving linear systems by Gauss-Jordan reduction, finding the inverse of a matrix by row reduction, equivalent matrices, determinants, properties of determinants, cofactor expansion, inverse of a matrix (via its determinant), other applications of determinants (Cramer's rule), vectors in the plane and in 3-space, vector space, subspaces, span and linear independence, basis and dimension, row space, null space, nullity and rank of a matrix, homogeneous systems, change of basis, transition matrices, orthogonalization, linear transformations, kernel and range of a linear transformation, eigenvalues and eigenvectors of a matrix.

Lecture 3 hrs/wk

Pre-requisite: MATH100

### **MATH-212 Probability and Statistics (3 CR)**

This course covers the principal concepts in statistics and probability. Topics in probability include: discrete random variables and probability distributions, continuous random variables and probability distributions. Topics in statistics include: random sampling and data description, point estimation of parameters, statistical intervals for a single sample, and tests of hypotheses for a single sample, correlation and regression. The course will include the use one of the following software packages (Excel, Matlab or R) for implementing the above-mentioned concepts.

Lecture 3 hrs/wk

Pre-requisite: MATH111

### **MATH-213 Differential Equation for Engineering (3 CR)**

Differential equations are fundamental tools for scientists and engineers in modeling any physical system. The course covers: first order differential equations, exact and linear equations, second order equations, higher order equations, solving system of ODE, Laplace transform solutions of differential equations and Finally, partial differential equations and its classification.

Lecture 3 hrs/wk

Pre-requisite: MATH112

### **MATH 214 Calculus III (3 CR)**

This course deals with Calculus (differentiation and integration) of functions of several variables. Topics include the study of Euclidian space, dot product, cross product, lines, planes, surfaces, tangent planes, gradient vector, linear approximation, multivariable chain rule, directional derivative, triple integrals, line integrals, spherical and cylindrical coordinates, vector fields, divergence, gradient, curl, theorem of Gauss, Stokes and Green, applications in engineering.

Lecture 3 hrs/wk

Pre-requisite: MATH 112

## **Physics**

### **PHYS-111 Physics I (3 CR)**

This course enables students to develop their skills in understanding physical concepts. It helps students approach questions in a logical and systematic manner. This course covers a variety of topics in mechanics that are relevant for the degrees offered at the polytechnic.

Lecture 3 hrs/wk, Tutorial 1 hr/wk

### **PHYS-111P Physics Lab I (1 CR)**

This Lab is an experimental course intended to complement Physics I. The purpose of the lab course is to explore some of the main concepts experimentally, which are covered in the Physics I course. Students will conduct, analyse and interpret experiments on timing, motion, forces and energy, rotational motion, forces and rotational energy and analyse and prepare lab reports working either individually or in teams. This course is to run alongside Physics I.

Lab 3 hrs/wk

Co-requisite: PHYS111

### **PHYS-112 Physics II (3 CR)**

This course enables students to develop their skills in understanding physics concepts of electricity and magnetism. It helps students approach questions in a logical and systematic manner. This course covers a variety of topics in electromagnetism that are relevant for the degrees offered at the polytechnic.

Lecture 3 hrs/wk, Tutorial 1 hr/wk

Pre-requisite: PHYS111; PHYS111P

### **PHYS-112P Physics Lab II (1 CR)**

This Lab is an experimental course intended to complement Physics II. The purpose of the lab course is to explore some of the main concepts experimentally, which are covered in the Physics II course. There will be experiments that include aspects of electric field, Ohm's law, resistors and capacitors in series and parallel, charging discharging the RC circuit, resonant frequency of LRC circuit, magnetic field, Magnetic through a coil (induction) and magnetic field in a current-carrying coil.

Lab 3 hrs/wk

Pre-requisite: PHYS111; PHYS111P

Co-requisite: PHYS112

## **Chemistry**

### **CHEM-111 Chemistry I (3 CR)**

Chemistry I is 4 credit hours course consisting of 3 credits for Chemistry I (Chem111) and Chemistry Lab (Chem111P) for 1 credit hour. The Chemistry I course introduces the elementary principles of chemistry and enables students to develop their problem solving skills and understanding the basic fundamentals of chemistry including SI units, unit conversions, significant figures, and periodic table. Emphasizes on chemical reactions and the use of symbolic representation and nomenclature, the mole concept and its applications and molecular structure, stoichiometry and solution stoichiometry, gases law and ideal gas law, and atomic structure and periodicity, chemical bonding and orbital hybridization.

Lecture 3 hrs/wk, Tutorial 1 hr/wk

### **CHEM-111P Chemistry Lab I (1 CR)**

This Lab is an experimental course intended to complement Chemistry I and designed for students majoring science and engineering technology. The purpose of the lab course is to explore the safety in chemical laboratories and the fundamental chemistry concepts experimentally, which are covered in the Chemistry I course. Students will conduct, analyse and interpret experiments on physical property, resolution of mixture, composition of element, empirical formula, stoichiometry, types of chemical reactions, gas laws and localized electron model. This course runs alongside with chemistry I and continued with chemistry II.

Lab 3 hrs/wk

Co-requisite: CHEM111

#### **CHEM-112 Chemistry II (3 CR)**

Chemistry II is 4 credit hours course consisting of 3 credits for Chemistry II (Chem112) and Chemistry Lab (Chem112P) for 1 credit hour. This course continues to provide the fundamentals of chemistry after students finished chemistry I. It emphasizes on the following topics thermochemistry, states of matter and their properties, phase diagrams, solutions composition and properties, chemical kinetics, chemical equilibrium, acids and bases and the fundamentals of electrochemistry

Lecture 3 hrs/wk, Tutorial 1 hr/wk

Pre-requisite: CHEM111; CHEM111P

#### **CHEM-112 Chemistry Lab II (1 CR)**

This Lab is an experimental course intended to complement Chemistry II. The purpose of the lab course is to explore chemistry concepts experimentally, which are covered in the Chemistry II course. Students will conduct, analyse and interpret experiments on calorimetry, phase diagram, colligative properties, rate and catalyst, chemical equilibrium constant, acid-base and electrochemistry. This course is to run alongside with Chemistry II.

Lab 3 hrs/wk

Pre-requisite: CHEM111; CHEM111P

Co-requisite: CHEM112

#### **CHEM-411 Environmental Science and Analyses (3 CR)**

Environmental Science and Analyses (CHEM411) is a senior level science elective course designed for engineering students who are in the 4th year and focusing on environmental science and analyses. The course introduces the different environmental spheres: hydrosphere, lithosphere, atmosphere and biosphere and their interaction with anthrosphere (technology). Furthermore, global awareness has grown considerably and focuses on environmental monitoring and protection. The course will cover an introduction to environmental science and engineering, green chemistry, environmental measurements, types of pollutants and their emission, transport of pollutants associated with analysis, water analysis, land and solid waste analysis, and atmospheric analysis. Finally, students will be introduced to the Environmental Impact Assessment (EIA) processes and reporting.

Lecture 3 hrs/wk

Pre-requisite: CHEM111 (or CHEM101)

## General Requirements Elective

#### **HUM-110 Life-long Learning Skills (3 CR)**

This Life-long Learning Skills course is designed to develop Emirati students' skills essential for success in the university and life. These skills include critical thinking, self-awareness and self-responsibility, problem solving, and soft skills, including teamwork. This course will also give students the information needed to achieve success in their academic life, such as note-taking, critical reading, e-learning, autonomous learning, and effective exam preparation.

Lecture 2 hrs/wk

#### **HUM-404 Leadership Skills (3 CR)**

This Leadership Skills course aims to develop students' leadership knowledge and abilities to become effective leaders in their chosen career. This course covers a variety of topics such as the nature of leadership, early theories of leadership, contemporary issues and views of leadership, developing effective leadership skills, leadership in teams and decision groups, strategic leadership in organizations, and ethical and authentic leadership.

Lecture 3hrs/wk

#### **HUM-402 Creativity, Innovation and entrepreneurship (3 CR)**

This course is designed to enable students to develop autonomy and self-direction in learning and to take personal ownership of the processes of planning and reviewing their own experiences and development. It is also designed to develop student's knowledge and skills in project management.

**Lecture 2hrs/wk**

**HUM-403 Personal Development Planning (2 CR)**

Creativity and innovation are essential skills in all engineering industries. Not only are AD Poly engineers expected to work at high international industry standards, but they need to find creative and innovative ways to make these same industries prosper in the UAE regardless of challenges that may be present. This course teaches students about the theory and practical aspects of creativity and innovation in a variety of settings.

**Lecture 3hrs/wk**

**Pre-requisite: ENGL122**

**HUM-212 Applied Research and Development Skills (3 CR)**

Applied Research and Development Skills (HUM-212) introduces students to applied research methods and techniques, and informs them of the relationship between research and development. Students develop applied research skills in engineering, gain knowledge on how to integrate research design and methodology to industrial development, and learn how to write a study plan based on a critical review of scientific reports/projects. Furthermore, students learn how to research new technology and plan R&D projects.

**Lecture 3hrs/wk**