



# **ABU DHABI POLYTECHNIC**

## **ACADEMIC SUPPORT DEPARTMENT**

General Catalogue

2021-2022

# 1. Course Descriptions

Descriptions of courses offered at ADPoly are listed below. The credit hours for each course is indicated after the course title. A credit hour is mainly based on the number of lecture hours per week and is less affected by the number of laboratory or on-the-job experience hours per week.

## 1.1 Academic Support Department courses

### 1.1.1 Chemistry (CHEM)

#### **CHEM1011 Chemistry I (3 CR)**

Chemistry I is 4 credit hours course package consisting of 3 credits for Chemistry I (Chem111) and 1 credit hour for Chemistry Lab (Chem111P). 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.

Co-requisite: CHEM1012

#### **CHEM1012 Chemistry Lab I (1 CR)**

This Lab is an experimental course intended to complement Chemistry I and designed for students majoring in 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: CHEM1011

#### **CHEM1013 Chemistry II (3 CR)**

Chemistry II is 4 credit hours course package consisting of 3 credits for Chemistry II (Chem112) and 1 credit for Chemistry Lab (Chem112P). 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-requisites: CHEM1011; CHEM111P

Co-requisite: CHEM1014

#### **CHEM1014 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-requisites: CHEM1011; CHEM1012

Co-requisite: CHEM1013

#### **CHEM4011 Environmental Science and Analyses (3 CR)**

Environmental Science and Analyses (CHEM4011) 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: CHEM1011

## 1.1.2 Engineering Fundamentals (ENG)

### **ENG1002 Engineering Drawings (2 CR)**

This course introduces the engineering drawing tools, schematic and engineering diagrams, and engineering operations. It provides the needed training to show typical drawing views and the proper way to show interior and exterior part details. This course relates lines and planes to orthographic projection to show the size and shape of objects. It includes application of principles and graphic elements of sectioning to show interior detail; and, the dimensioning techniques and symbol usage common to all drafting disciplines. Students will learn how to read, interpret and understand 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.

Lecture 1 hr/wk, lab 2 hrs/wk

### **ENG1001 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

### **ENG1003 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.

Lab 3 hrs/wk

### **ENG1011 Introduction to Computer Electronics (3 CR)**

This course introduces the fundamentals of electronics as an integral part of computers for the students of computer engineering and information technology. It provides the fundamental knowledge of analogue 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 learn to use it to assist them in the develop and analysis of circuits.

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

### **ENG2011 Thermodynamics (3 CR)**

In this course basic concepts and definitions of thermodynamics, properties of pure substances, the first law of thermodynamics for the closed and open systems, the second law of thermodynamics, Entropy analysis and thermodynamics cycles (Carnot cycle) are introduced.

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

Pre-requisites: MATH1010, PHYS1011, and CHEM1013

**ENG2012 Statics and Strength of Materials (3 CR)**

This course aims at studying basic concepts and fundamentals of material science and engineering. Topics covered include atomic structure, arrangements, unit cells, types of engineering materials, testing, mechanical and electrical properties, processing, in service behavior, deformation.

Lecture 3 hrs/wk

Pre-requisite: MATH1001, PHYS1011

**ENG2013 Fluid Flow and Heat Transfer (3 CR)**

The overall course objective is to develop students' knowledge in principles of hydrostatic fluid mechanics (pressure variation, buoyancy and manometers), principles of fluid flow, principles and concepts related to heat transfer, concepts and principles of heat exchangers.

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

Pre-requisite: ENG2011, MATH1010

**1.1.3 English (ENGL)**

Note: During the Academic Year 2019-2020, ADPoly revised its English curriculum. Some of the English courses listed below are either no longer offered, or will only be offered for a limited time during the transition from one catalog to another.

**ENGL1001 English Skills (0 CR)**

This course focuses on the development of fundamental English communication skills most needed for students preparing for further studies.

Lecture 3 hr/wk, Practical 2 hrs/wk

Pre-requisite: Placement exam; IELTS 5.0/EmSAT 1100

**ENGL1011 Academic English I (3 CR)**

This course focuses on the development of intermediate English communication skills most needed for students preparing for further studies.

Lecture 3 hrs/wk, Practical 2 hrs/wk

Pre-requisite: Completion of ENGL1001 English Skills; IELTS 6.0 (all bands  $\geq 5.5$ ); EmSAT 1300

**ENGL1012 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.

Lecture 3 hrs/wk, Practical: 2 hrs/wk

Pre-requisite: ENGL1011 or IELTS (6.5 with all bands 6.0 or above) or EmSAT (1500 or above)

**ENGL2011 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, Online lecture 1 hr/wk, Tutorial 1 hr/wk

Pre-requisite: ENGL1012

**ENGL2012 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, Online lecture 1 hr/wk, Tutorial 1 hr/wk

Pre-requisite: ENGL1012

**ENGL2013 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, Online lecture 1 hr/wk, Tutorial 1 hr/wk

Pre-requisite: ENGL1012

***The following English courses although included in continuing students' Study Plans may no longer be offered and are to be substituted by above the English courses starting AY2019-2020 (students should consult with their advisors):***

**ENGL-111 English Communication Skills (3 CR)**

This course enables students to develop their language skills to communicate effectively for lifelong learning. This course covers a variety of relevant topics and skills, such as engineering, technology, health and safety issues; English grammar and lexical items; and effective writing for industry.

Lecture 3 hrs/wk

Pre-requisite: IELTS  $\geq$  5 (This course may be waived for students with an IELTS  $\geq$  6.0 with all bands of at least 5.5)

**ENGL-112 Technical English Skills (3 CR)**

This course focuses on developing students' language skills in technical communication genres. It is designed to introduce students to information and language specifically for future technical careers. Covered in this course are the following: the importance of Technical Communication (TC); the goals of TC, ethical and legal considerations; verbal and nonverbal communication; features of effective oral presentations; routine correspondence; document design; descriptions and process analyses; long, formal reports; short, informal reports; and evaluation of criteria and reasons for conducting research in TC.

Lecture 3 hrs/wk

Pre-requisite: ENGL111

**ENGL-113 English for Oil & Gas (3 CR)**

This course provides petroleum engineering students with the language, information, and skills that they need in their field of study and future careers. It enables them to learn and practice the English language and specialist terms they need in real work situations. Consequently, this course develops the students' lexical items, language skills, and knowledge to understand the oil and gas industries, so they can then apply this knowledge practically. It covers a range of subjects, such as historical developments of the oil & gas industries, upstream, midstream, downstream processes, sedimentation and hydrocarbons, as well as product distribution and principles of supply and demand.

Lecture 3 hrs/wk

Pre-requisite: ENGL112

**ENGL-114 English for Electromechanical Engineering (3 CR)**

This English for Engineering course develops students' English language competencies in preparation for a career in electromechanical engineering. Students will explore engineering lexicon and refine their written communication skills while evaluating and creating technical reports on a variety of current topics related to the electromechanical engineering industry. To complete these tasks, students will also acquire an upper-intermediate level of knowledge in grammar and research techniques. Finally students will hone in on their verbal and non-verbal communication skills for a more polished presentation of current electromechanical engineering topics.

Lecture 3 hrs/wk

Pre-requisite: ENGL112

**ENGL-115 English for IT (3 CR)**

In addition to refining students' competencies in grammar, ICT vocabulary, and oral and written comprehension and expression, this course endeavors to apply students' knowledge in the exploration of current topics of critical interest in the ICT sector. Students will also hone their mastery of professional communication skills through hands-on exercises in customer care, project management, meeting and presentation facilitation, research, and report writing.

Lecture 3 hrs/wk

Pre-requisite: ENGL112

**ENGL-116 English for Aviation (3 CR)**

This course is designed to introduce students to the domain-specific terms and skills. Throughout this course, students will be trained to give descriptions, explanations, and information using aviation specific topics and vocabulary. They will also be able to use the language skills they have picked up in previous English courses within aviation context.

Lecture 3 hrs/wk

Pre-requisite: ENGL112

**ENGL-117 English for Meteorology (3 CR)**

This course focuses on developing students' English language skills in preparation for a career in Meteorology Sciences. It introduces students to information and language specific to Meteorology. Covered in this course are the following: Meteorology careers and relevant topics; technology and equipment used in Meteorology; analytical thinking; formal, oral presentations; writing and editing relevant short reports; lexical items in relevant contexts; and English grammar.

Lecture 3 hrs/wk

Pre-requisite: ENGL112

**ENGL-118 Technical Writing (3 CR)**

Technical Writing aims to develop students' skills to be skilled writers in their chosen career. This course covers a variety of topics, such as appropriate usage of tools for professional writers, using international business English, writing and editing emails for various audiences, writing reports for industry, and an intermediate knowledge of grammar and writing.

Lecture 3 hrs/wk

Pre-requisite: ENGL112

**29.1.4 Humanities (HUM)****HUM-110 Lifelong Learning Skills (3 CR)**

This Lifelong Learning 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 and leadership. Students will use these skills to contribute to their local communities as they will identify areas of need and then volunteer during the semester. Students will also acquire information needed to achieve success in their academic life, such as note-taking, critical reading, e-learning, autonomous learning, and effective exam preparation, plus they will learn employment-related skills which help them develop professional networking and set career goals.

Lecture 3 hrs/wk

**HUM-111 Islamic Civilization (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 Emirati Society and Culture (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

#### **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 3 hrs/wk

#### **HUM-401 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 3 hrs/wk

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

Creativity, innovation, and entrepreneurship are essential skills in gaining a competitive advantage in today's global economic environment. Increasingly, organizations are seeking employees that are creative and have innovative and entrepreneurial know-how. Through real world examples and research from experts in the field, students will learn how to incorporate design thinking, entrepreneurship, and growth and leadership into the UAE's society and their own personal and professional development.

Lecture 3 hrs/wk

Pre-requisite: ENGL112 (Students in the 2<sup>nd</sup> year and higher are recommended to take this course—not 1<sup>st</sup> year students.)

#### **HUM-403 Personal Development Planning (2 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 2 hrs/wk

### **29.1.5 Information Computer Technology (ICT)**

### **ICT1011 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/week; tutorial: 2 hrs/week; Lab: 2 hrs/week

## **29.1.6 Mathematics (MATH)**

### **MATH1001 Precalculus (3 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, trigonometry, radian measure, and oblique triangles, plotting trigonometric functions, 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.

Lecture 4 hrs/wk, Tutorial 1 hr /wk

### **MATH1010 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: MATH1001 or grade greater or equal to 70% in the Math Placement Exam

### **MATH1020 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.

Lecture 3 hrs/wk.

Pre-requisite: MATH1010

### **MATH2011 Linear Algebra (3 CR)**

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 (Cramers 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: MATH1001

### **MATH2012 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: MATH1010

### **MATH2013 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: MATH1020

### **MATH2114 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: MATH1020

## **29.1.7 Physics (PHYS)**

### **PHYS1011 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.

### **PHYS1012 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, analyze and interpret experiments on timing, motion, forces and energy, rotational motion, forces and rotational energy and analyze and prepare lab reports working either individually or in teams. This course is to run alongside Physics I.

Lab 3 hrs/wk.

### **PHYS1013 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.

Prerequisite: PHYS-111, MATH1001

### **PHYS1014 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

Prerequisite: PHYS-111, PHYS-111P