

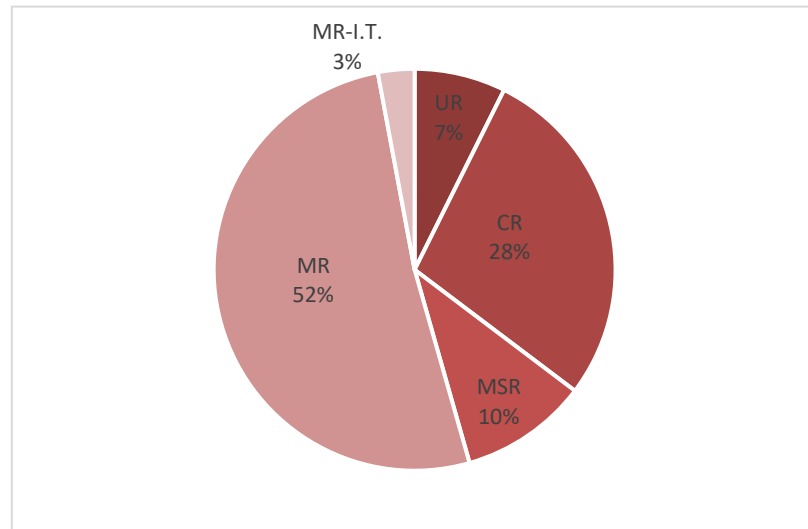
Associate Diploma of Science in Mechanical Engineering

An Exit Qualification from the Mechanical Engineering B.Sc. Program

for Students Admitted to B.SC Program (2014-2022)

Program Components

Course Type	CRD
University Requirement (UR)	5
College Requirement (CR)	19
Major Support Requirement (MSR)	7
Major Requirement (MR)	35
MR-Industrial Training	2
Total Credit (CRD)	68



List of Courses

University Requirements

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ARAB 110, or HIST 122, or ISLM 101	Arabic Language Skills Modern History of Bahrain and Citizenship Islamic Culture	3	0	3	UR	-----	No
HRLC 107	Human Rights	2	0	2	UR	-----	No

College Requirements

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
CHEMY 101	General Chemistry I	3	3	4	CR	-----	No
ENGL 101	Communication Skills I	3	0	3	CR	-----	No
ENGL 102	Composition and Reading II	3	0	3	CR	ENGL 101	No
MATHS 101	Calculus I	3	0	3	CR	-----	No
MATHS 102	Calculus II	3	0	3	CR	MATHS 101	No
CSC 103	Computer Programming for Scientists and Engineers	3	2	3	CR	-----	No

Major Support Requirements

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
PHYCS 111	Fundamentals of Physics	3	3	4	MSR	-----	No
PHYCS 209	Bulk Properties of Matter	2	3	3	MCR	PHYCS 111	No

Major Requirements

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
MENG 110	Workshop Processes	1	3	2	MR		YES
MENG 160	Engineering Graphics	2	6	4	MR		YES
MENG 163	Statics	3	1	3	MR	PHYCS 110	YES
MENG 201	Materials Science	3	1	3	MR	CHEMY 101	YES
MENG 210	Manufacturing Processes	3	1	3	MR	MENG 110	YES
MENG 231	Engineering Thermodynamics	3	1	3	MR	PHYCS 209	YES
MENG 235	Applied Thermodynamics	3	1	3	MR	MENG 231	YES
MENG 242	Report Writing and Presentation	1	1	1	MR	ENGL 102	YES
MENG 263	Dynamics	3	1	3	MR	MENG 163	YES
MENG 290	Junior Project	0	3	1	MR	MENG 242	YES
MENG 310	Manufacturing Processes II	3	1	3	MR	MENG 210	YES
MENG 334	Fluid Mechanics	3	1	3	MR	MATHS 205	YES
MENG 335	Heat Transfer	3	1	3	MR	MENG 334	YES

Industrial Training

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
MENG 291	Industrial Training I	0	6	2	MR- Training	Completion of 45 credits	Yes

Courses Descriptions

University Requirements Courses Descriptions

Course Code: ARAB 110

Course Title: Arabic Language Skills

This course focuses on basic Arabic skills, including form, function, and meaning. It also helps the student to appreciate and understand structures and approach them from a critical point of view, through various genres in literature.

Course Code: HIST 122

Course Title: Modern History of Bahrain and Citizenship

Spatial identity of Bahrain: Brief history of Bahrain until the 18th century; the historical roots of the formation of the national identity of Bahrain since the 18th century; the modern state and evolution of constitutional life in Bahrain; the Arabic and Islamic dimensions of the identity of Bahrain; the core values of Bahrain's society and citizenship rights (legal, political, civil and economic); duties; responsibilities and community participation; economic change and development in Bahrain; Bahrain's Gulf, Arab and international relations.

Course Code: HRLC 107

Course Title: Human Rights

This course deals with the principles of human rights in terms of the definition of human rights, scope, sources with a focus on the International Bill of Human Rights; The Charter of the United Nations; Universal Declaration of Human Rights; The International Covenant on Economics, Social and Culture rights; Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment; Mechanics and the Constitutional Protection of Rights and Public Freedoms in Kingdom of Bahrain.

Course Code: ISLM 101

Course Title: Islamic Culture

An introduction to the general outline and principles of Islamic culture, its general characteristics, its relationships with other cultures, general principles of Islam in beliefs, worship, legislation and ethics.

College Requirement Courses Descriptions

Course Code: CHEMY 101

Course Title: General Chemistry I

Significant figures, chemical formulas and equations; mass relations, limiting reactions and theoretical yield; Physical behavior of gases; electronic structure, periodic table, covalent bonding; Lewis structures, Molecular structures, hybridization; molecular orbitals, solutions; colligative properties. Related practical work.

Course Code: CSC 103

Course Title: Computer Programming for Scientists and Engineers

Introduction to computers, their uses, development, components, hardware, and software. Internal representation and numbering systems. Algorithmic problem-solving principles. Introduction to a modern programming language (e.g. C++). Input/Output, conditional statements, iteration, files, strings, functions and arrays. Lab assignments to practice programming.

Course Code: ENGL 101

Course Title: Communication Skills I

This course focuses on reading skills and strategies and language development. The reading section concentrates on high-interest contemporary topics and encourages students to increase speed and efficiency. The writing component, integrated to the reading materials, reviews grammatical structures, develops language accuracy and introduces paragraph writing. Students are required to upgrade their grammar, reading, and listening skills on the internet.

Course Code: ENGL 102

Course Title: Composition and Reading II

A continuation of English 101, which further develops the students' skills in reading and writing. The course exposes students to a wider range of reading material aimed at developing their understanding of different styles of English.

Course Code: MATHS 101

Course Title: Calculus I

Algebra. Functions and graphs. Trigonometry. Conic sections. Limits and continuity. Derivatives and integrals. Applications of derivatives which include mean value theorem, extrema of functions and optimization. Definite integrals and the Fundamental Theorem of Calculus.

Course Code: MATHS 102

Course Title: Calculus II

Applications of definite integrals, including areas, volumes and surface areas of solids of revolution, arc length and centroids. Transcendental functions, indeterminate form and L'Hopital's Rule. Techniques of integration and improper integrals. Infinite series, power series. Maclaurin and Taylor Theorem.

Major Support Courses Descriptions

Course Code: PHYCS 111

Course Title: Fundamentals of Physics for Engineering and Education

Vectors and scalars; straight line and projectile motion; Newton's laws of motion; work, energy and power, momentum and impulse; rotational motion; periodic motion; the electric field; Gauss's law; electric potential; capacitance and dielectrics; magnetic fields and magnetic forces.

Course Code: PHYCS 209

Course Title: Bulk Properties of Matter

Elasticity; fluid statics and dynamics; mechanical waves; vibrating bodies; acoustic phenomena; kinetic theory of gases; first and second law of thermodynamics; geometrical optics.

Major Courses Descriptions

Course Code: MENG 110

Course Title: Workshop Processes

Safety in workshop. Engineering materials. Measurements: linear and angular measurements, gauges and comparison measurements. Layout tools and procedures. Hand tools and bench works. Material removal processes: shaping, turning, milling, drilling and grinding. Casting and forming processes: sand casting, centrifugal casting, forging, rolling, and sheet metal works. Joining processes: gas welding, arc welding, resistance welding and plastic welding.

Course Code: MENG 160

Course Title: Engineering Graphics

Introduction to AutoCAD, basic AutoCAD 2-D drawing and modifying commands: isometric and oblique views, orthographic projection, sectional and auxiliary views, linear dimensioning, fundamentals of interpenetrations and developments of surfaces. Limits and fits: geometric tolerances, fasteners and fastenings, surface finish notations, welds and welding symbols and representations of standard elements.

Course Code: MENG 163

Course Title: Statics

Introduction to statics, forces in plane, forces in space, equilibrium of particles and rigid bodies in two and three dimensions, centroid and center of gravity, distributed forces, moment of inertia, analysis of trusses, frames and machines, forces in beams, friction in square-threaded screws and bolts, method of virtual work.

Course Code: MENG 201

Course Title: Materials Science

Introduction and classification of materials. Bonding. Structure of Materials. Imperfections in solids. Phase diagrams and microstructure. Diffusion. Phase transformations. Mechanical behavior of materials. Viscoelasticity. Electrical and magnetic properties. Effect of environment on behavior of materials. Introduction to failure analysis. Materials selection in mechanical design. Case studies. Use of computers in materials science.

Course Code: MENG 210

Course Title: Manufacturing Processes I

Production of iron and steel. Production of aluminum. Metal casting: sand casting, die casting, and investment casting. Bulk deformation processes: hot and cold working, forging, rolling, extrusion and drawing. Joining of materials: welding of metals, adhesive joining.

Course Code: MENG 231

Course Title: Engineering Thermodynamics

Thermodynamic systems, property, state, process, cycle and equilibrium. Energy and the first law of thermodynamics: Energy balance for closed systems, energy analysis for cycles. Properties of pure substances. Control volume energy analysis. Second law of thermodynamics: statements of second law, Carnot cycle. Maximum performance measures for power, refrigeration and heat pump cycles operating between two reservoirs.

Course Code: MENG 235

Course Title: Applied Thermodynamics

Second law of thermodynamics. Irreversibility and availability: second law efficiency, non-flow exergy and flow exergy. Exergy destruction. Vapor power cycles and exergy analysis: basic Rankine cycle, Otto cycle, Diesel cycle, Brayton cycle. Refrigeration: vapor-compression refrigeration, refrigerant properties, absorption refrigeration. Heat pump systems. Nonreacting ideal gas mixtures and Psychrometrics. Dry-bulb and wet-bulb temperatures. Psychrometric charts and psychrometric applications.

Course Code: MENG 242

Course Title: Technical Report Writing and Presentation

Technical Report Writing prepares students to design and compose effective technical documents, with particular emphasis on technical reports and oral presentations. The lecture hour is dedicated to theories, techniques and presentations. The tutorial hour is assigned to discuss the written reports feedbacks.

Course Code: MENG 263

Course Title: Dynamics

Rectilinear and curvilinear motion of the particles, kinetics of particles, linear and angular momentum, work, energy and power, principle of impulse and momentum, impact: kinematics of rigid bodies, kinetics of rigid bodies, introduction to three-dimensional dynamics of rigid bodies. Computer applications are employed throughout the course.

Course Code: MENG 290

Course Title: Junior Project

The course is meant to develop creative design skills in the students by exposing them to some ongoing important projects in the country and requiring them to submit report on a chosen project highlighting various design components. Field trips may be arranged in coordination with the industry. The project will emphasize independent learning and teamwork. The lectures will include introduction to chemical engineering profession, description of various areas of specialization, professional report writing techniques and the role of chemical engineers in the society.

Course Code: MENG 310

Course Title: Manufacturing Processes II

Sheet metal processes: Piercing, coining, stamping, deep drawing, and stretch forming. Metal cutting: theory of metal cutting, multi-point cutting, abrasive cutting, machinability and economics of metal cutting. Non-traditional machining. CNC machining. Powder and polymer processing. Metrology: Surface texture and geometrical feature measurement.

Course Code: MENG 334

Course Title: Fluid Mechanics

Fluid kinematics, energy and Bernoulli's equation. Dimensional analysis and similitude. Differential relations in three dimensions: velocity and acceleration, Navier Stokes relations, energy relation, introduction to stream and potential functions, introduction to boundary layer theory with applications to flat plates, cylinders, internal and external pipe flows. Compressible flow, normal shock waves.

Course Code: MENG 335

Course Title: Heat Transfer

Basic modes of heat transfer. Thermal circuits, surface energy balance. Steady one-dimensional heat conduction, conduction across flat plate, cylindrical and spherical shells. Fins. Convection fundamentals and correlations, external flow, internal flow, tube banks, impinging jets, packed beds. Types of heat exchangers, overall heat transfer coefficient, design of heat exchanger. Radiation, black body and gray radiation, view factor, radiation exchange between surfaces.

Course Code: MENG 291

Course Title: Industrial Training I

In this training course, all students in the program must participate in an approved training program in the relevant industry. At the completion of 300 hours of supervised training, each student must submit a formal report and conduct an oral presentation.