BEMS16

ACK
الكلية الأسترالية في الكويت
Australian College of Kuwait

Bachelor of Engineering Technology

(Mechanical)

Units Description

Australian College of Kuwait

(Spring 2016 and onwards)

BEMS16

MECHANICAL ENGINEERING				
SEMESTER (1)				
Unit Code	**Unit Code**	**Unit Name**	**Pre-Requisite**	**Credits**
16SMCE310	ENEG11001	Engineering Skills * **(PBL)**	N/A	3
16SMAT310	MATH11219	Engineering Mathematics	N/A	4
16SMAT311	PHYS11184	Engineering Physics A	N/A	4
16SMCE311	ENEM12007	Statics & Dynamics	N/A	3
SEMESTER (2)				
	Unit Code	**Unit Name**	**Pre-Requisite**	**Credits**
SEMESTER (2)				
	Unit Code	**Unit Name**	**Pre-Requisite**	**Credits**
16SMCE320	ENEM13014	Thermodynamics	16SMAT310 16SMAT311	3
16SMCE321	ENEG12004	Engineering Design & Management Planning * **(PBL)**	16SMCE310	6
16SMCE322	ENEC13010	Solid Mechanics	16SMCE311	3
16SMCE323	ENEG12005	Materials Science and Engineering	16SMAT310 16SMAT311	3
SUMMER SEMESTER (2)				
16SMCE333	New Unit	Internship	16SMCE321 Complete 30 Credit Hours	4
SEMESTER (3)				
	Unit Code	**Unit Name**	**Pre-Requisite**	**Credits**
16SMCE410	ENTG13002	Project Planning * **(PBL)**	16SMCE321	3
16SMCE411	ENEG12006	Engineering Design & Management Implementation * **(PBL)**	16SMCE321	6
16SMCE412	ENEM12006	Fluid Mechanics	16SMCE320	3
16SMCE413	ENEM14013	Engineering Plant Design	16SMCE322	3
SEMESTER (4)				
	Unit code	**Unit name**	**Pre-requisite**	**Credits**
16SMCE420	ENEM13011	Fluid and Electrical Drive System * **(PBL)**	16SMCE411 16SMCE412	6
16SMCE421	ENTG13001	Project Implementation * **(PBL)**	16SMCE410	3
16SMCE422	ENEM14011	Energy Conversion	16SMCE412	3
16SMCE423	ENEM13013	Mechanical Systems	16SMCE413	3

* **(PBL)** – Project Based Leaning Unit

BEMS16

Bachelor of Engineering Technology (Mechanical)

SEMESTER (1)

1. (16SMCE310) Engineering Skills – PBL Unit

Prerequisites: None
Credits: 3

Students are introduced to the role of professional engineers as mediators between the technical, business, social, cultural, environmental, economic and political contexts of engineering activities. They investigate and select materials and processes for engineering applications and justify decisions made. Students apply information literacy skills and information technology skills to engineering projects; they use drawing, modeling and simulation tools to analyze and present project outcomes; they apply risk assessment and workplace health and safety assessment to engineering activities; and they design, conduct and report on practical, hands-on activities. The learning is supported by compulsory class sessions. Students explore the complex nature of engineering activities and the need to deal with uncertainty and conflicting information, they prepare a portfolio to demonstrate development of a professional attitude, problem-solving skills, technical knowledge and productive work practices, and provide evidence of a professional capacity to communicate, work and learn productively, both individually and in teams.

2. (16SMAT310) Engineering Mathematics

Prerequisites: None
Credits: 4

In this course students apply the essential calculus concepts, processes and techniques to develop mathematical models for engineering problems. They use the Fundamental Theorem of Calculus to illustrate the relationship between the derivative and the integral of a function and apply the theorem to engineering problems involving definite integrals. Differential calculus is used to construct mathematical models, which investigate a variety of rate of change and optimization problems. The standard rules and techniques of integration are included. Differential equations are introduced and applied to investigate more interesting problems in an engineering setting. Other important elements of this course are the communication of results, concepts and ideas using mathematics as a language, being able to document the solution to problems in a way that demonstrates a clear, logical and precise approach and communicating, working and learning in peer learning teams where appropriate.

3. (16SMAT311) Engineering Physics A

Prerequisites: None
Credits: 4

This course introduces the principles of engineering physics and aims to develop a fundamental understanding of several broad areas of physics (mechanics, fluids, wave properties, properties of matter and heat) applied to engineering and technology. The course provides practical experience in experimental and measurement techniques used to investigate these physical phenomena and develops related professional communication, information literacy and teamwork skills.

4. (16SMCE311) Statics and Dynamics

Prerequisites: None
Credits: 3

This course develops principles of engineering mechanics. Students calculate the geometrical properties of cross sections, analyze loads on engineering structures, determine support reactions, and distribution of forces and moments in members. They analyze problems involving particle and rigid body motion and simple vibratory systems. Students communicate, work and learn both individually and in teams, using appropriate mechanical engineering language, they document the process of modeling and analysis and present the information in a professional manner.

BEMS16

SEMESTER (2)

5. (16SMCE320) Thermodynamics

Prerequisites:
(16SMAT310) Engineering Mathematics
(16SMAT311) Engineering Physics A

Credits: 3

The unit introduces students to the basic methods underlying the design and analysis of thermal energy systems. It emphasizes understanding thermodynamics principles and applying them to practical situations. It aims to give students the necessary skills to carry out basic design and performance analysis in the area of power exchange in steam, and similar plant, steam and gas turbines, engines and refrigeration systems.

6. (16SMCE321) Engineering Design and Management Planning – PBL Unit

Prerequisites: (16SMCE310) Engineering Skills

Credits: 6

In this course students should be able to apply project management techniques to conceptual design of engineering projects. They reflect on project activities and develop and describe their personal framework for engineering design and project management. Students produce a conceptual design and project specifications aligned with relevant Standards and current engineering practice given a loosely formed client brief. They describe and explain the conduct and management of engineering enterprises and of the structure and capabilities of the engineering workforce, and they demonstrate and justify the incorporation of a systems approach to design activities based on a broad sustainability framework. Students identify, justify and apply the technical knowledge and skills required to successfully complete an engineering project, and produce professional and technically competent project management and design documentation. Students prepare a portfolio to demonstrate development of a professional attitude; problem-solving skills, technical knowledge and productive work practices, and they provide evidence of a professional capacity to communicate, work and learn productively, both individually and in teams. The learning is supported by compulsory class sessions.

7. (16SMCE322) Solid Mechanics

Prerequisites: (16SMCE311) Statics and Dynamics

Credits: 3

Students will use the principles of engineering mechanics to analyze structural members subjected to torsion, bending and shear stresses. Principle stresses will be calculated for members subjected to combined stresses. The course outlines modes of failure including fatigue in engineering materials. Students use appropriate "civil engineering language" in context, document the process of modeling and analysis and present information, and communicate, work and learn, both individually and in teams in a professional manner**.**

8. (16SMCE323) Material Science and Engineering

Prerequisites:

(16SMAT310) Engineering Mathematics
(16SMAT311) Engineering Physics

Credits: 3

This course introduces students to the properties of engineering materials and their classification, and selection for given applications. They explain relationships between material properties and the internal structures of materials, and explain processes modify these structures to improve material properties. Students should be able to analyze failures of materials, explain failure mechanisms and determine measures to protect against such failures. They describe and choose standard methods of testing for given situations, indicate expected results and limitations of results. Students conduct, analyze, interpret, draw conclusions from and report on materials tests. They apply information literacy skills to obtain relevant engineering information and identify appropriate standards and practices.

SUMMER SEMESTER (2)

9. (16SMCE324) Internship

Prerequisites: (16SMCE321) Engineering Design and Management Planning & Complete 30 Credit Hours

Credits: 4

Duration: (5) hours x (6) weeks x (5) days = 150 Hours

This course covers the professional experience, through training in the execution of real life engineering projects. Practical training aims at developing practical skills for the student so that he/she might develop an awareness of job requirements and become qualified to practice a specialization in a sound and systematic way. It might also help a student to find or locate later job opportunities at the same training site if he/she is able to demonstrate competence and obtain the satisfaction of the Field Supervisor and those responsible at the site.

SEMESTER (3)

10. (16SMCE410) Project Planning – PBL Unit

Prerequisites: (16SMCE321) Engineering Design and Management Planning – PBL Unit

Credits: 3

Students in the final year of their Bachelor of Engineering Technology program working independently to find and plan a project that allows them to demonstrate professional capabilities expected of graduating engineering technologists. Formal and informal project reporting articulates the analysis of project planning issues and critical thinking behind project choices and decisions made. Students report to and work with guidance from a supervisor to scope and define the project, undertake research into project issues, incorporate safety and risk issues, produce a plan and schedule for implementation of the project in the subsequent project implementation course, and produce informal and formal projects reports and presentations

11. (16SMCE411) Engineering Design and Management Implementation – PBL Unit

Prerequisites:

(16SMCE321) Engineering Design and Management Planning

Credits: 6

In this course students should be able to apply project management techniques to conceptual design of engineering projects. They reflect on project activities and continue to develop and describe their personal framework for engineering design and project management. Students design or select components and elements required for a project and develop a detailed project design consistent with Australian Standards and current engineering practice given a conceptual design and client approved project specifications. They model and evaluate the detailed design and demonstrate and justify the incorporation of a systems approach to design activities based on a broad sustainability framework. Students identify, justify and apply the technical knowledge and skills required to successfully complete an engineering project, and produce professional and technically competent project management and design documentation. Students prepare a portfolio to demonstrate development of a professional attitude; problem-solving skills, technical knowledge and productive work practices, and they provide evidence of a professional capacity to communicate, work and learn productively, both individually and in teams. The learning outcomes associated with the implementation of the design are satisfactorily achieved through a compulsory residential school.

12. (16SMCE412) Fluid Mechanics

Prerequisites:

(16SMCE320) Thermodynamics

Credits: 3

This course introduces the fundamental properties of fluids, analysis of pipe flow and analysis of buoyancy and stability of floating objects. It presents methods of analyzing fluid systems using the concept of a control volume combined with the conservation of mass and momentum equations. Students

analyze incompressible flows in pipe systems and use similitude and modeling principles and techniques to solve problems in fluid mechanics. Students will prepare technical and laboratory reports using appropriate "mechanical engineering language", and document the process of modeling and analysis. They are required to act professionally in presenting information, communicating, working and learning, both individually and in teams.

13. (16SMCE413) Engineering Plant Design

Prerequisites: (16SMCE322) Solid Mechanics

Credits: 3

This course provides students with opportunities to develop and demonstrate their professional capabilities in the design of mechanical equipment associated with processing plant within the context of the minerals processing and associated heavy industries. Students apply engineering theories, practices, standards and tools to design of equipment and apply their knowledge of strength of materials, tolerances and modes of failure to design. The emphasis is on the design of machine elements as components of larger systems requiring analysis to be reduced to subsystems, assemblies and components, and how the performance of the whole system is affected by the performance of its constituent parts. The design process equipment and drivelines, and describe specific design issues that apply to common process and general engineering components and equipment. Students evaluate and explain their design decisions, selections and design features. Students will be required to apply their existing knowledge of statics, dynamics, vibrations, strength of materials, thermo fluids to design tasks, comply with relevant codes of practice and use numerical methods and computer aided design tools where appropriate. They are required to show they can work productively and professionally, both individually and in project teams, to solve problems, and document and communicate their work clearly in a professional manner

SEMESTER (4)

14. (16SMCE420) Fluid and Electrical Drive System – PBL Unit

Prerequisites: (16SMCE411) Engineering Design and Management Implementation
(16SMCE412) Fluid Mechanics

Credits: 6

This project based course introduces fluid and electrical drives and the design of integrated drive systems for use in industry. It covers comparison of characteristics, construction, selection, design and operation of fluid and electric drives and drive systems, use of mathematical models to analyze performance, machine protection and control schemes, and evaluation of drive system performance. Students apply formulas and explain and record calculations. They adopt professional approaches to work in teams and learn collaboratively to manage and complete projects, they manage their own learning, and communicate professionally using discipline language to investigate, design and check work, and present designs and problem solutions.

15. (16SMCE421) Project Implementation – PBL Unit

Prerequisites: (16SMCE410) Project Planning

Credits: 3

The purpose of this course is to provide students who are in the final year of their program with an opportunity to carry out an authentic work assignment type project, which closely approximates technologist's activities in industry. It is expected that while carrying out the project, students will develop their expertise as well as practice skills in the project's discipline are.

16. (16SMCE422) Energy Conversion

Prerequisites: (16SMCE412) Fluid Mechanics

Credits: 3

This course introduces students to key concepts and principles required to analyze problems involving heat exchange and energy conversion. They analyze and design heat exchangers and analyze performance of compressors, internal combustion engines, gas turbines and jet propulsion. Students analyze combustion processes and estimate pollutant emissions, and analyze and design nozzles to promote safe and efficient combustion. They prepare technical and laboratory reports that demonstrate critical evaluation of results and experimental uncertainties. Students are required to show they work productively, both individually and collaboratively, to solve problems, and document and communicate their work clearly in a professional manner.

17. (16SMCE423) Mechanical Systems

Prerequisites: (16SMCE413) Engineering Plant Design

Credits: 3

This unit describes the behavior and analysis of mechanical systems. Students will be able to apply knowledge of engineering science and mathematics to model and analyze mechanical systems and consider the nature of engineering assumptions and effects uncertainty on analysis and modeling. They will apply control theory, design and analyze mathematical models, and use simulation software to predict behavior of mechanical systems. Students will be expected to apply the modeling and analysis of mechanical systems to industrial contexts, working and learning productively in teams and alone to complete projects, to develop interpersonal and technical communication skills and prepare professional documentation of problem solutions and project reports.