CEC Undergraduate Programs

Bachelor of Science in Mechanical Engineering

The Bachelor of Science in Mechanical Engineering consists of a 4-year undergraduate curriculum that prepares students for a wide range of careers and new technologies, as well as for advanced study. Mechanical engineers work on diverse, challenging problems that require the integration of science, engineering, and socio-economic knowledge. Mechanical engineering covers the design and analysis of all kinds of systems and technologies with mechanical components, with applications in energy production, robotics, environmental systems, materials, composites, transportation, manufacturing, machine design and many more areas. The program objectives are:

1. To provide students with a critical understanding of fundamental scientific and engineering principles related to mechanical systems.
2. To equip students with the necessary technical expertise and practical skills required for a career in mechanical engineering, including hands-on experience with tools, software, and technologies used in the field.
3. To encourage collaboration with peers from different disciplines and promote an understanding of the multidisciplinary nature of engineering projects.
4. To foster ethical considerations and professional standards in mechanical engineering, emphasizing integrity, responsibility, and sustainable practices.

Program Learning Outcomes (PLOs)

The Program Learning Outcomes (PLOs) are those required by the Engineering Accreditation Commission of ABET in its Criterion 3. PLOs are outcomes (1) through (7).

- ✓ Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- ✓ Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- ✓ Communicate effectively with a range of audiences.
- ✓ Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- ✓ Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- ✓ Develop and conduct appropriate experimentation, analysis and data interpretation, and use engineering judgment to draw conclusions.
- ✓ Acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Structure

All students pursuing the Bachelor of Science in Mechanical Engineering must complete a minimum of 132 credits with a cumulative GPA of 2.0 or better. Specifically, the requirements are as follows:

- A minimum of (39) credits of General Education Requirements
- A minimum of (26) credits of Engineering Core Requirements
- A minimum of (52) credits of Major Requirements
- A minimum of (6) credits of Professional Elective Options
- A minimum of (9) credits of Major Electives
- Graduate Portfolio

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Curriculum Plan – BSc in Mechanical Engineering

Course Code	Course Title	CH	Pre-requisites
General Education Requirements	Total Credits	39	
National Requirements	Total Credits	7	
ARHG 104/ARHG 101	Arabic for Arabic Speakers/Arabic for Non-Arabic Speakers	3	
ARHG 106	Modern History of Bahrain	2	
ARHG 107	Human Rights	2	
English Requirements	Total Credits	6	
ENGL 101	Composition I	3	
ENGL 102	Composition II	3	ENGL 101
Mathematics Requirements	Total Credits	8	
MATH 153	Calculus I	4	
MATH 154	Calculus II	4	MATH 153
ICT Requirements	Total Credits	3	
COSC 101	Introduction to Computing	3	
Lifelong Learning Requirements	Total Credits	1	
UNSS 101	University Success	1	
Natural Science Requirements	Total Credits	8	
Students should complete a minimum of 8 credits, including at least 2 credit lab from the Natural Science list of the general Education tabulated below.			
Arts and Humanities Requirements	Total Credits	3	
Students should complete a minimum of 3 credits from the Arts and Humanities list of the general Education tabulated below			
Social and Behavioral Science Requirements	Total Credits	3	
Students should complete a minimum of 3 credits, from the Social and Behavioral Science list of the general Education tabulated below.			
Arts and Humanities List			
ANTH 152	Introduction to Cultural Anthropology	3	
HUMS 101	Forms and Ideas in the Humanities	3	
HIST 201	World History	3	
TURK 101	Turkish for Beginners	3	
CCHN 101	Spoken Mandarin	3	
COMS 356	Intercultural Communication	3	ENGL 101
PHIL 101	Introduction to Philosophy	3	
ENGL 103	Public Speaking	3	
PHIL 201	Oriental and Islamic Philosophy	3	
Natural Sciences List			
CHEM 101	Introductory Chemistry	3	co-requisite of CHEM 101L
CHEM 101L	Introductory Chemistry Laboratory	1	co-requisite of CHEM 101
PHYS 101	Principles of Physics I	3	co-requisite of PHYS 101L
PHYS 101L	Principles of Physics I Laboratory	1	co-requisite of PHYS 101
Social and Behavioral Sciences List			
PSYC 101	Introduction to Psychology	3	
SOCS 101	Introduction to Sociology	3	
ENGL 205	Business Communication	3	
SUST 101	Principles of Sustainability	3	
POLS 321	Comparative Political Ideologies	3	
PSYC 202	Mind Matters: A Practical Exploration	3	

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Curriculum Plan – BSc in Mechanical Engineering

Program Core Requirments	Total Credits	26	
ENGR 100	Introduction to Engineering	1	
ENGR 105	Programming for Engineers	2	COSC 101
CIVL 200	Engineering Mechanics - Statics	3	PHYS 101
ENGR 202	Engineering Mathematics	3	MATH 154
MECH 241	Engineering Materials	2	CIVL 200, CHEM 101
MATH 252	Calculus III	4	MATH 154
PHYS 102	Principles of Physics II	3	PHYS 101, PHYS 101L, MATH 153, co-requisite: PHYS 102L
PHYS 102L	Principles of Physics II Laboratory	1	PHYS 101, PHYS 101L, MATH 153, co-requisite: PHYS 102
ENGR 342	Engineering Economic Analysis	3	MATH 154
ENGR 401	Entrepreneurship for Engineers	2	ENGR 205
ENGR 205	Multidisciplinary Research Methods	2	ENGL 102
Program Major Requirements	**Total Credits**	**52**	
ELEC 204	Principles of Electrical Engineering	3	PHYS 102
MECH 101	Solid Modeling I	3	MATH 153
MECH 220	Engineering Mechanics - Dynamics	3	CIVL 200
MECH 241L	Engineering Materials Laboratory	1	Co-requisite: MECH 241
CIVL 302	Mechanics of Materials	3	CIVL 200
MECH 310	Introduction to Engineering Design	3	CIVL 302
MECH 313	Numerical Analysis of Engineering Systems	3	MECH 220, ENGR 105
MECH 314	Engineering Design: Mechanical Components	3	CIVL 302
MECH 458	Automatic Control Systems	2	MECH 313, and MATH 252
MECH 458L	Automatic Control Systems Laboratory	1	Co-requisite: MECH 458
MECH 341	Manufacturing Processes	3	MECH 241
MECH 350	Thermodynamics	3	MATH 252
MECH 451	Fluid Mechanics	3	MATH 252
MECH 451L	Fluid Mechanics Laboratory	1	Co-requisite: MECH 451
MECH 406	Mechanical Engineering Internship	3	(88 credits), CGPA 2.0
MECH 453	Heat Transfer	3	MECH 451
MECH 490L	Mechanical And Thermal Systems Laboratory	1	MECH 350, and MECH 453
MECH 499A	Mechanical Engineering Design: Capstone Project I	2	Senior Level (90 credits), CGPA 2.0
MECH 499B	Mechanical Engineering Design: Capstone Project II	2	MECH 499A
MECH 496	Advanced Machine Design	3	MECH 314 and MECH 341
MECH 498	Thermal Systems Analysis and Design	3	MECH 350 and MECH 453
Program Major Electives Options	**Total Credits**	**9**	
Students pursuing the Bachelor of Science in Mechanical Engineering must complete a minimum of 9 elective credits from the following list or any other course approved by the College of Engineering and Computing:			
MECH 457	Mechanical Vibrations	3	MECH 220, CIVL 302
MECH 440	Computer-Aided Manufacturing	3	MECH 310, MECH 341
MECH 410	Heating, Ventilating and Air-Conditioning	3	MECH 350, MECH 453
MECH 430	Industrial Management	3	MATH 252
MECH 460	Computational Fluid Dynamics	3	MECH 451
MECH 454	Renewable Energy and Sustainable Technology	3	MECH 453
MECH 470	Machinery Fault Diagnosis and Signal Processing	3	MATH 252
Professional Elective Options	**Total Credits**	**6**	
Students pursuing a Bachelor of Mechanical Engineering must complete a minimum of 6 elective credits from general educations courses or any other programs at 200 level or above.			
Internship	**Total Credits**	**3**	
To qualify for the Bachelor of Science in Mechanical Engineering a student must fulfill the internship requirements prior to graduation. The purpose of the internship is to expose students to the profession and give them an opportunity to apply their academic knowledge in a practical setting. The internship consists of a minimum of 280 work hours (8 weeks) with an approved employer. Internships are evaluated by the internship coordinator with a pass/fail grade.			
Program Total Credits		**132**	

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Proposed Study Plan (MECH) - AY 2025 - 2026

First Year

1st Semester

Course Code	Course Title	CH	Pre-requisites
ENGL 101	Composition I	3	
UNSS 101	University Success	1	
COSC 101	Introduction to Computing	3	
MATH 153	Calculus I	4	
CHEM 101	Introductory Chemistry	3	co-requisite of CHEM 101L
CHEM 101L	Introductory Chemistry Laboratory	1	co-requisite of CHEM 101
TOTAL		15	

2nd Semester

Course Code	Course Title	CH	Pre-requisites
ENGL 102	Composition II	3	ENGL 101
ARHG 106	Modern History of Bahrain	2	
MATH 154	Calculus II	4	MATH 153
PHYS 101	Principles of Physics I	3	co-requisite of PHYS 101L
PHYS 101L	Principles of Physics I Laboratory	1	co-requisite of PHYS 101
XXXX	Art and Humanities Requirements	3	
ENGR 100	Introduction to Engineering	1	
TOTAL		17	

Second Year

3rd Semester

Course Code	Course Title	CH	Pre-requisites
ARHG 104/ARHG 101	Arabic for Arabic Speakers/Arabic for Non-Arabic Speakers	3	
CIVL 200	Engineering Mechanics - Statics	3	PHYS 101
PHYS 102	Principles of Physics II	3	PHYS 101, PHYS 101L, MATH 153, co-requisite: PHYS 102L
PHYS 102L	Principles of Physics II Laboratory	1	PHYS 101, PHYS 101L, MATH 153, co-requisite: PHYS 102
ENGR 105	Programming for Engineers	2	COSC 101
MATH 252	Professional Elective 1	3	MATH 154
TOTAL		15	

4th Semester

Course Code	Course Title	CH	Pre-requisites
ENGR 202	Engineering Mathematics	3	MATH 154
ELEC 204	Principles of Electrical Engineering	3	PHYS 102
MECH 101	Solid Modeling I	3	MATH 153
ARHG 107	Human Rights	2	
MECH 220	Engineering Mechanics - Dynamics	3	CIVL 200
ENGR 205	Multidisciplinary Research Methods	2	ENGL 102
XXXX	Professional Elective	3	
TOTAL		19	

Third Year

5th Semester

Course Code	Course Title	CH	Pre-requisites
MECH 241	Engineering Materials	2	CIVL 200, CHEM 101
MECH 241L	Engineering Materials Laboratory	1	Co-requisite: MECH 241
XXXX	Social and Behavioral Science Requirements	3	
MECH 313	Numerical Analysis of Engineering Systems	3	MECH 220, ENGR 105
ENGR 342	Engineering Economic Analysis	3	MATH 154
CIVL 302	Mechanics of Materials	3	CIVL 200
ENGR 401	Entrepreneurship for Engineers	2	ENGR 205
TOTAL		17	

6th Semester

Course Code	Course Title	CH	Pre-requisites
MECH 310	Introduction to Engineering Design	3	CIVL 302
MECH 350	Thermodynamics	3	MATH 252
XXXX	Professional Elective 2	3	
XXXX	Major Elective 1	3	
MECH 451	Fluid Mechanics	3	MATH 252
MECH 451L	Fluid Mechanics Laboratory	1	Co-requisite: MECH 451
TOTAL		16	

Summer Semester

Course Code	Course Title	CH	Pre-requisites
MECH 406	Mechanical Engineering Internship	3	(88 credits), CGPA 2.0
TOTAL		3	

Fourth Year

7th Semester

Course Code	Course Title	CH	Pre-requisites
XXXX	Major Elective 2	3	
MECH 458	Automatic Control Systems	2	MECH 313, and MATH 252
MECH 458L	Automatic Control Systems Laboratory	1	Co-requisite: MECH 458
MECH 453	Heat Transfer	3	MECH 451
MECH 341	Manufacturing Processes	3	MECH 241
MECH 314	Engineering Design: Mechanical Components	3	CIVL 302
MECH 499A	Mechanical Engineering Design: Capstone Project I	2	Senior Level (90 credits), CGPA 2.0
TOTAL		17	

8th Semester

Course Code	Course Title	CH	Pre-requisites
MECH 490L	Mechanical And Thermal Systems Laboratory	1	MECH 350, and MECH 453
MECH 499B	Mechanical Engineering Design: Capstone Project II	2	MECH 499A
MECH 496	Advanced Machine Design	3	MECH 314 and MECH 341
MECH 498	Thermal Systems Analysis and Design	3	MECH 350 and MECH 453
XXXX	Major Elective 3	3	
TOTAL		12	