CEC Undergraduate Programs

Bachelor of Science in Computer Engineering

The Bachelor of Science in Computer Engineering is a 4-year undergraduate curriculum that aims at producing the best-skilled, hands-on, practicing computer engineer. More specifically, the objectives are:

1. To equip students with the technical knowledge and skills that will enable them to have a successful career in the computer engineering profession.
2. To provide students with a general education that will enable them to appreciate the social, ethical, economic, and environmental dimensions of problems they may face.
3. To develop students' communication skills and social skills that are necessary to work effectively with others.
4. To develop students' ability to solve problems by analyzing what is already known and then applying logic and creativity to find a solution.
5. To equip students with the intellectual skills necessary to continue learning and to stay current with the profession as it changes.

Program Learning Outcomes (PLOs)

The Program Learning Outcomes (PLOs) are:

- ✓ Identify, formulate and solve complex engineering problems by applying principles of knowledge of science, mathematics and electrical & computer engineering.
- ✓ Ability to Apply engineering and IT design to design reliable systems, devices or processes from initial specifications to a deliverable system, that meet specified needs but always with care and consideration for public health, safety and welfare, as well as for global, cultural, social, environmental.
- ✓ Communicate effectively with a range of audiences.
- ✓ Recognize ethical and professional responsibilities in engineering and IT situations and make informed judgments, which must consider the impact of engineering and IT solutions to global, economic, environmental and societal contexts.
- ✓ Function effectively as part of 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 interpretation of data, and use scientific 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 Computer Engineering must complete a minimum of 124 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 (40) credits of Computing Requirements
- A minimum of (30) credits of Major Requirements
- A minimum of (9) credits of Major Electives
- A minimum of (6) credits of Professional Elective Options
- Graduate Portfolio

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Curriculum Plan – BSc in Computer 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 Computer Engineering

Program Core Requirments	Total Credits	40	
COSC 102	Object-Oriented Programming	3	COSC 101
COSC 125	Data Structure and Programming Techniques	3	COSC 102
MATH 203	Discrete Mathematics	3	MATH 153
CMPE 215	Communication Networks	3	COSC 125
ENGR 205	Multidisciplinary Research Methods	2	ENGL 102
MATH 255	Introduction to Linear Algebra	3	MATH 153
MATH 260	Probability and Statistics	4	MATH 154
CMPE 270	Digital Systems	3	MATH 153
CMPE 270L	Digital Systems Laboratory	1	Corequisite CMPE 270
CMPE 271	Computer Organization	3	COSC 102, CMPE 270
COSC 312	Design and Usage of Databases	3	MATH 203, COSC 125
COSC 372	Operating Systems	3	CMPE271
COSC 372L	Operating Systems Laboratory	1	Co-requisite COSC 372
SWEN 360	Software Design and Engineering	3	COSC 125
ENGR 401	Entrepreneurship for Engineers	2	ENGR 205
Program Major Requirements	**Total Credits**	**30**	
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 202	Engineering Mathematics	3	MATH 154
ELEC 320	Circuit Analysis	3	PHYS 102, Math 154
CMPE 410L	Computer Engineering Professional Certificate	1	Senior Level (90 Credits)
CMPE 470	Digital Circuits	3	CMPE 270
CMPE 412	Microprocessors	3	CMPE 271
CMPE 478	Embedded Systems Programming	3	CMPE 412
CMPE 499A	Engineering Design: Capstone Project I	1	Senior level (90 Credits), CGPA 2.0, SWEN 360, CMPE 470
CMPE 499B	Engineering Design: Capstone Project II	3	CMPE 499A
ELEC 330	Fundamentals of Engineering Electronics	3	ELEC 320
CMPE 406	Computer Engineering Internship	3	80 credits, CGPA 2.0.
Program Major Electives Options	**Total Credits**	**9**	
Students pursuing the Bachelor of Science in Computer 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:			
CYBR 470	Cryptography	3	MATH 203
CMPE 482	Robotics	3	COSC 372L
DSAI 474	Computer Vision	3	Math 260, COSC 125
CMPE 425	Advanced IoT	3	CMPE 412
CMPE 467	Network Management	3	CMPE 215
Professional Elective Options	**Total Credits**	**6**	
Students pursuing the Bachelor of Science in Computer Engineering must complete a minimum of 6 elective credits from general education course or any other programs at 200 level or above.			
Internship	**Total Credits**	**3**	
To qualify for the Bachelor of Science in Computer 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		**124**	

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Proposed Study Plan (CMPE) - 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	
	Natural Science Requirement	3	
	Natural Science Lab Requirement	1	
TOTAL		15	

2nd Semester

Course Code	Course Title	CH	Pre-requisites
ENGL 102	Composition II	3	ENGL 101
ARHG 104/ARHG 101	Arabic for Arabic Speakers/Arabic for Non-Arabic Speakers	3	
MATH 154	Calculus II	4	MATH 153
COSC 102	Object-Oriented Programming	3	COSC 101
	Natural Science Requirement	3	
	Natural Science Lab Requirement	1	
TOTAL		17	

Second Year

3rd Semester

Course Code	Course Title	CH	Pre-requisites
COSC 125	Data Structure and Programming Techniques	3	COSC 102
MATH 203	Discrete Mathematics	3	MATH 153
CMPE 270	Digital Systems	3	MATH 153
CMPE 270L	Digital Systems Laboratory	1	Corequisite CMPE 270
MATH 255	Introduction to Linear Algebra	3	MATH 153
TOTAL		13	

4th Semester

Course Code	Course Title	CH	Pre-requisites
MATH 260	Probability and Statistics	4	MATH 154
CMPE 215	Communication Networks	3	COSC 125
CMPE 271	Computer Organization	3	COSC 102, CMPE 270
ENGR 205	Multidisciplinary Research Methods	2	ENGL 102
ENGR 202	Engineering Mathematics	3	MATH 154
TOTAL		15	

Third Year

5th Semester

Course Code	Course Title	CH	Pre-requisites
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
COSC 372	Operating Systems	3	CMPE271
COSC 372L	Operating Systems Laboratory	1	Co-requisite COSC 372
COSC 312	Design and Usage of Databases	3	MATH 203 and COSC 125
SWEN 360	Software Design and Engineering	3	COSC 125
ENGR 401	Entrepreneurship for Engineers	2	ENGR 205
TOTAL		16	

6th Semester

Course Code	Course Title	CH	Pre-requisites
ELEC 320	Circuit Analysis	3	PHYS 102, Math 154
CMPE 470	Digital Circuits	3	CMPE 270
CMPE 412	Microprocessors	3	CMPE 271
XXXX	Arts and Humanities Requirements	3	
ARHG 107	Human Rights	2	
XXXX	Major Electives 1	3	
TOTAL		17	

Summer Semester

Course Code	Course Title	CH	Pre-requisites
CMPE 406	Computer Engineering Internship	3	80 credits, CGPA 2.0.
TOTAL		3	

Fourth Year

7th Semester

Course Code	Course Title	CH	Pre-requisites
CMPE 478	Embedded Systems Programming	3	CMPE 412
CMPE 499A	Engineering Design: Capstone Project I	1	Senior level (90 Credits), CGPA 2.0, SWEN 360, CMPE 470
CMPE 410L	Computer Engineering Professional Certificate	1	Senior Level (90 Credits)
ARHG 106	Modern History of Bahrain	2	
XXXX	Professional Elective 1	3	
XXXX	Major Elective 2	3	
TOTAL		13	

8th Semester

Course Code	Course Title	CH	Pre-requisites
ELEC 330	Fundamentals of Engineering Electronics	3	ELEC 320
XXXX	Social and Behaviroal Science Requiremetns	3	
CMPE 499B	Engineering Design: Capstone Project II	3	CMPE 499A
XXXX	Professional Elective 2	3	
XXXX	Major Elective 3	3	
TOTAL		15	