CEC Undergraduate Programs

Bachelor of Science in Software Engineering

The Bachelor of Science in Software Engineering is a 4-year undergraduate curriculum designed to provide students with a comprehensive understanding of software development principles, methodologies, and practices. The program aims to equip students with the skills and knowledge necessary to design, develop, test, and maintain software systems that meet the needs of various industries and organizations. More specifically, the objectives of the program are:

1. To provide students with a strong foundation in computer science principles, programming languages, and software engineering fundamentals.
2. To equip students with the skills and techniques necessary to analyze user requirements, design software solutions, and implement them using appropriate software development methodologies.
3. To train students in the use of modern software engineering tools and technologies, including software development environments, version control systems, and automated testing frameworks.
4. To educate students on software quality assurance practices, including software testing, debugging, and maintenance, to ensure the reliability and efficiency of software systems.
5. To foster teamwork, communication, and project management skills in students, enabling them to work effectively in software development teams and deliver projects on time and within budget.
6. To prepare students for a successful career in software engineering and for advanced study in related disciplines at the graduate level.

Program Learning Outcomes (PLOs)

The Program Learning Outcomes (PLOs) are:

- ✓ an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- ✓ an ability to 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.
- ✓ an ability to communicate effectively with a range of audiences.
- ✓ an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- ✓ an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- ✓ an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- ✓ an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Structure

All students pursuing the Bachelor of Science in Software Engineering must complete a minimum of 130 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 (36) 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 Software 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 4 credits, including at least 1 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			
TURK 101	Turkish for Beginners	3	
CCHN 101	Spoken Mandarin	3	
PHIL 101	Introduction to Philosophy	3	
ANTH 152	Introduction to Cultural Anthropology	3	
HUMS 101	Forms and Ideas in the Humanities	3	
HIST 201	World History	3	
ENGL 103	Public Speaking	3	
COMS 356	Intercultural Communication	3	ENGL 101
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 Software 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**	**33**	
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
DSAI 310	Introduction to Data Science	3	MATH 260, COSC 102
CYBR 310	Introduction to Cybersecurity	3	CMPE 215
SWEN 360L	Software Design and Engineering Laboratory	1	Co-requisite SWEN 360
CYBR 460	Secure Software Design and Engineering	3	SWEN 360
SWEN 320	Human Computer Interaction	2	COSC 125
SWEN 370	Software Requirements Engineering	3	SWEN 360
SWEN 470	Software Design and Architecture	3	SWEN 370
SWEN 460	Software Testing and Quality Assurance	3	SWEN 370
COSC 485	Web Engineering	3	COSC 312
SWEN 410L	Software Engineering Professional Certificate	1	Senior Level (90 Credits)
SWEN 499A	Software Engineering Design Project A	1	Senior level (90 Credits), CGPA 2.0, SWEN 360/L
SWEN 499B	Software Engineering Design Project B	3	SWEN 499A
SWEN 406	Software Engineering Internship	3	86 credits, CGPA 2.0.
Program Major Electives Options	**Total Credits**	**9**	
Students pursuing the Bachelor of Science in Software 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:			
SWEN 475	Object Oriented Design	3	SWEN 360/L
COSC 486	Mobile Programming	3	COSC 312
COSC 415	Cloud Computing	3	COSC 372
COSC 412	Implementation of Database Systems	3	COSC 312
CYBR 415	Cloud Security and Privacy	3	CMPE 215
CYBR 465	Web application Security	3	COSC 312, CYBR 310
Professional Elective Options	**Total Credits**	**6**	
Students pursuing the Bachelor of Science in Software 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 Software 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		**127**	

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Proposed Study Plan (SWEN) - AY 2025 - 2026

First Year

1st Semester

Course Code	Course Title	CH	Pre-requisites
ENGL 101	Composition I	3	
MATH 153	Calculus I	4	
XXXX	National Science Requirement	3	
XXXX	National Science Requirement Laboratory	1	
UNSS 101	University Success	1	
COSC 101	Introduction to Computing	3	
TOTAL		15	

2nd Semester

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

Second Year

3rd Semester

Course Code	Course Title	CH	Pre-requisites
MATH 203	Discrete Mathematics	3	MATH 153
CMPE 270	Digital Systems	3	MATH 153
CMPE 270L	Digital Systems Laboratory	1	Corequisite CMPE 270
XXXX	Social and Behavioral Science Requirements	3	
MATH 255	Introduction to Linear Algebra	3	MATH 153
COSC 125	Data Structure and Programming Techniques	3	COSC 102
TOTAL		16	

4th Semester

Course Code	Course Title	CH	Pre-requisites
MATH 260	Probability and Statistics	4	MATH 154
SWEN 320	Human Computer Interaction	2	COSC 125
CMPE 271	Computer Organization	3	COSC 102, CMPE 270
ARHG 106	Modern History of Bahrain	2	
CMPE 215	Communication Networks	3	COSC 125
ENGR 205	Multidisciplinary Research Methods	2	ENGL 102
TOTAL		16	

Third Year

5th Semester

Course Code	Course Title	CH	Pre-requisites
CYBR 310	Introduction to Cybersecurity	3	CMPE 215
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, COSC 125
SWEN 360	Software Design and Engineering	3	COSC 125
SWEN 360L	Software Design and Engineering Laboratory	1	Co-requisite SWEN 360
ENGR 401	Entrepreneurship for Engineers	2	ENGR 205
TOTAL		16	

6th 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
XXXX	Arts and Humanities Requirements	3	
DSAI 310	Introduction to Data Science	3	MATH 260, COSC 102
SWEN 370	Software Requirements Engineering	3	SWEN 360
XXXX	Major Elective 1	3	
TOTAL		16	

Summer Semester

Course Code	Course Title	CH	Pre-requisites
SWEN 406	Software Engineering Internship	3	86 credits, CGPA 2.0.
TOTAL		3	

Fourth Year

7th Semester

Course Code	Course Title	CH	Pre-requisites
COSC 485	Web Engineering	3	COSC 312
CYBR 460	Secure Software Design and Engineering	3	SWEN 360
SWEN 499A	Software Engineering Design Project A	1	Senior level (90 Credits), CGPA 2.0, SWEN 360/L
SWEN 470	Software Design and Architecture	3	SWEN 370
XXXX	Major Elective 2	3	
XXXX	Professional Elective 1	3	
TOTAL		16	

8th Semester

Course Code	Course Title	CH	Pre-requisites
SWEN 460	Software Testing and Quality Assurance	3	SWEN 370
SWEN 499B	Software Engineering Design Project B	3	SWEN 499A
SWEN 410L	Software Engineering Professional Certificate	1	Senior Level (90 Credits)
ARHG 107	Human Rights	2	
XXXX	Professional Elective 2	3	
XXXX	Major Elective 3	3	
TOTAL		15	