CEC Undergraduate Programs

Bachelor of Science in Computer Science

The Bachelor of Science in Computer Science consists of a 4-year undergraduate curriculum that aims to produce practicing computer scientists with the highest level of skills in the industry. More specifically, the objectives of the program are:

1. To provide students with the technical knowledge and skills which will enable them to have a successful career in the computer science 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 and social skills which are essential for working effectively in a group.
4. To develop students' ability to solve problems by applying logic and creativity to what they have learned in order to find a solution.
5. To provide students with the intellectual skills necessary for continuous learning in order to keep up with the constantly evolving industry.

Program Learning Outcomes (PLOs)

The Program Learning Outcomes (PLOs) are:

- ✓ Demonstrate critical knowledge and understanding of mathematics and current technical concepts and practices in the core of computing.
- ✓ Critically analyze the complexity of real problems, identify, define the computing requirements appropriate to its solution and evaluate the performance.
- ✓ Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline
- ✓ Communicate effectively in a variety of professional contexts
- ✓ Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- ✓ Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- ✓ Apply computer science theory and software development fundamentals to produce computing-based solutions.

Program Structure

All students pursuing the Bachelor of Science in Computer Science must complete a minimum of 127 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 (33) 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 Science

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
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
BIOL 101	Principles of Biology I	3	co-requisite BIOL 101L
BIOL 101L	Principles of Biology I Laboratory	1	co-requisite BIOL 101
ASTR 352	Current Developments in Astronomy	3	co-requisite of ASTR 352L
ASTR 352L	Current Developments in Astronomy Laboratory	1	co-requisite of ASTR 352
ENVS 201	Environmental Science	3	co-requisite of ENVS 201L
ENVS 201L	Environmental Science Laboratory	1	co-requisite of ENVS 201
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 Science

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**	
COSC 210	Management Information Systems	3	COSC 101
COSC 248	Algorithms and Complexity	3	MATH 203, COSC 125
DSAI 310	Introduction to Data Science	3	MATH 260, COSC 102
COSC 406	Computer Science Internship	3	83 credits, CGPA 2.0.
SWEN 360L	Software Design and Engineering Laboratory	1	Co-requisite SWEN 360
CYBR 310	Introduction to Cybersecurity	3	CMPE 215
DSAI 465			
COSC 415	Cloud Computing	3	COSC 372
CMPE 467	Network Management	3	CMPE 215
COSC 485	Web Engineering	3	COSC 312
COSC 410L	Computer Science Professional Certificate	1	Senior Level (90 credits)
COSC 499A	Computer Science Design Project A	1	Senior level (90 Credits), CGPA 2.0, SWEN 360/L
COSC 499B	Computer Science Design Project B	3	COSC 499A
Program Major Electives Options	**Total Credits**	**9**	
Students pursuing the Bachelor of Science in Computer Science must complete a minimum of 9 elective credits from the following list or any other course approved by the College of Engineering and Computing:			
DSAI 422	Data Mining	3	DSAI 310
CYBR 470	Cryptography	3	MATH 203
COSC 412	Implementation of Database Systems	3	COSC 312
COSC 486	Mobile Programming	3	COSC 312
DSAI 482	Big Data Technologies	3	DSAI 310
DSAI 474	Computer Vision	3	Math 260, COSC 125
Professional Elective Options	**Total Credits**	**6**	
Students pursuing the Bachelor of Science in Computer Science 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 Science 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 (COSC) - 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	Natural Science Requirement	3	
XXXX	Natural Science Requirement Lab	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	ENGL 101
MATH 154	Calculus II	4	MATH 153
XXXX	Natural Science Requirement	3	
XXXX	Natural Science Requirement Lab	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
ARHG 106	Modern History of Bahrain	2	
CMPE 271	Computer Organization	3	COSC 102, CMPE 270
COSC 248	Algorithms and Complexity	3	MATH 203, COSC 125
CMPE 215	Communication Networks	3	COSC 125
ENGR 205	Multidisciplinary Research Methods	2	ENGL 102
TOTAL		17	

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
ARHG 107	Human Rights	2	
XXXX	Arts and Humanitites Requirements	3	
COSC 210	Management Information Systems	3	COSC 101
DSAI 310	Introduction to Data Science	3	MATH 260, COSC 102
COSC 415	Cloud Computing	3	COSC 372
TOTAL		14	

Summer Semester

Course Code	Course Title	CH	Pre-requisites
COSC 406	Computer Science Internship	3	83 credits, CGPA 2.0.
TOTAL		3	

Fourth Year

7th Semester

Course Code	Course Title	CH	Pre-requisites
COSC 485	Web Engineering	3	COSC 312
COSC 499A	Computer Science Design Project A	1	Senior level (90 Credits), CGPA 2.0, SWEN 360/L
COSC 410L	Computer Science Professional Certificate	1	Senior Level (90 credits)
XXXX	Major Elective 1	3	
XXXX	Major Elective 2	3	
XXXX	Professional Elective 1	3	
TOTAL		14	

8th Semester

Course Code	Course Title	CH	Pre-requisites
DSAI 465	Artificial Intelligence	3	If Industrial Engineering Student: DSAI 310 or COSC 390 If Data Science and AI Student: DSAI 310
CMPE 467	Network Management	3	CMPE 215
COSC 499B	Computer Science Design Project B	3	COSC 499A
XXXX	Professional Elective 2	3	
XXXX	Major Elective 3	3	
TOTAL		15	