CEC Undergraduate Programs

Bachelor of Science in Data Science and AI

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

1. To provide students with a solid foundation in mathematics, statistics, and computer science principles, as well as specialized knowledge in the field of data science and artificial intelligence.

2. To equip students with the skills and techniques necessary to collect, clean, and analyze large datasets using various data science tools and programming languages.

3. To train students in the application of machine learning algorithms and artificial intelligence techniques to develop predictive models, natural language processing systems, computer vision applications, and other AI-driven solutions.

4. To educate students on the ethical and responsible use of data science and artificial intelligence, including considerations of privacy, bias, and fairness.

5. To foster critical thinking and problem-solving skills in students, enabling them to identify opportunities for applying data science and AI in various domains and industries.

6. To prepare students for a successful career in the field of data science and artificial intelligence, as well as for advanced study in related disciplines at the graduate level.

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, Data Science, and Artificial Intelligence.
- ✓ Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- ✓ 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 theory, techniques, and tools throughout the data science lifecycle and employ the resulting knowledge to satisfy stakeholders' needs.

Program Structure

All students pursuing the Bachelor of Science in Data Science and Artificial Intelligence 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 Data Science and AI

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 Data Science and AI

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	
COSC 248	Algorithms and Complexity	3	MATH 203, COSC 125
DSAI 310	Introduction to Data Science	3	MATH 260, COSC 102
DSAI 370	Data Analytics Ethics	3	DSAI 310
SWEN 360L	Software Design and Engineering Laboratory	1	Co-requisite SWEN 360
CYBR 310	Introduction to Cybersecurity	3	CMPE 215
DSAI 380	Data Visualization	3	DSAI 310
DSAI 474	Computer Vision	3	Math 260, COSC 125
DSAI 462	Advanced Computational Statistics	3	DSAI 310
DSAI 482	Big Data Technologies	3	DSAI 310
DSAI 465			
DSAI 410L	Data Science Professional Certificate	1	Senior Level (90 Credits)
DSAI 406	Data Science Internship	3	86 credits, CGPA 2.0.
DSAI 499A	Data Science Design Project A	1	Senior Level (90 credits), CGPA 2.0, SWEN 360/L
DSAI 499B	Data Science Design Project B	3	DSAI 499A
Program Major Electives Options	Total Credits	9	
Students pursuing the Bachelor of Science in Data Science and Artificial Intelligence must complete a minimum of 9 elective credits from the following list or any other course approved by the College of Engineering:			
DSAI 450	Business Intelligence	3	DSAI 465
DSAI 472	Social and Behavioral Analytics	3	DSAI 310
DSAI 420	Marketing Analytics	3	DSAI 310
DSAI 448	Sports Analytics	3	DSAI 310
DSAI 460	Internet of Things Analytics	3	DSAI 310
DSAI 422	Data Mining	3	DSAI 310
Professional Elective Options	Total Credits	6	
Students pursuing the Bachelor of Science in Data Science and Artificial Intelligence 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 Data Science and Artificial Intelligence 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 (DSAI) - AY 2025 - 2026

First Year

1st Semester				2nd Semester			
Course Code	Course Title	CH	Pre-requisites	Course Code	Course Title	CH	Pre-requisites
ENGL 101	Composition I	3		ENGL 102	Composition II	3	ENGL 101
MATH 153	Calculus I	4		MATH 154	Calculus II	4	MATH 153
XXXX	Natural Science Requirement	3		XXXX	Natural Science Requirement	3	
XXXX	Natural Science Requirement Lab	1		XXXX	Natural Science Requirement Lab	1	
UNSS 101	University Success	1		COSC 102	Object-Oriented Programming	3	COSC 101
COSC 101	Introduction to Computing	3		ARHG 104/ARHG 101	Arabic for Arabic Speakers/Arabic for Non-Arabic Speakers	3	
TOTAL		15		TOTAL		17	

Second Year

3rd Semester				4th Semester			
Course Code	Course Title	CH	Pre-requisites	Course Code	Course Title	CH	Pre-requisites
MATH 203	Discrete Mathematics	3	MATH 153	MATH 260	Probability and Statistics	4	MATH 154
CMPE 270	Digital Systems	3	MATH 153	ARHG 106	Modern History of Bahrain	2	
CMPE 270L	Digital Systems Laboratory	1	Corequisite CMPE 270	CMPE 271	Computer Organization	3	COSC 102, CMPE 270
XXXX	Social and Behavioral Science Requirements	3		COSC 248	Algorithms and Complexity	3	MATH 203, COSC 125
MATH 255	Introduction to Linear Algebra	3	MATH 153	CMPE 215	Communication Networks	3	COSC 125
COSC 125	Data Structure and Programming Techniques	3	COSC 102	ENGR 205	Multidisciplinary Research Methods	2	ENGL 102
TOTAL		16		TOTAL		17	

Third Year

5th Semester				6th Semester			
Course Code	Course Title	CH	Pre-requisites	Course Code	Course Title	CH	Pre-requisites
DSAI 310	Introduction to Data Science	3	MATH 260, COSC 102	ARHG 107	Human Rights	2	
COSC 372	Operating Systems	3	CMPE271	XXXX	Arts and Humanities Requirements	3	
COSC 372L	Operating Systems Laboratory	1	Co-requisite COSC 372	DSAI 370	Data Analytics Ethics	3	DSAI 310
COSC 312	Design and Usage of Databases	3	MATH 203, COSC 125	CYBR 310	Introduction to Cybersecurity	3	CMPE 215
SWEN 360	Software Design and Engineering	3	COSC 125	DSAI 380	Data Visualization	3	DSAI 310
SWEN 360L	Software Design and Engineering Laboratory	1	Co-requisite SWEN 360	DSAI 482	Big Data Technologies	3	DSAI 310
ENGR 401	Entrepreneurship for Engineers	2	ENGR 205				
TOTAL		16		TOTAL		17	

Summer Semester

Course Code	Course Title	CH	Pre-requisites
DSAI 406	Data Science Internship	3	86 credits, CGPA 2.0.
TOTAL		3	

Fourth Year

7th Semester				8th Semester			
Course Code	Course Title	CH	Pre-requisites	Course Code	Course Title	CH	Pre-requisites
DSAI 465				DSAI 462	Advanced Computational Statistics	3	DSAI 310
DSAI 499A	Data Science Design Project A	1	Senior Level (90 credits), CGPA 2.0, SWEN 360/L	DSAI 474	Computer Vision	3	Math 260, COSC 125
DSAI 410L	Data Science Professional Certificate	1	Senior Level (90 Credits)	DSAI 499B	Data Science Design Project B	3	DSAI 499A
XXXX	Major Elective 1	3		XXXX	Professional Elective 2	3	
XXXX	Major Elective 2	3		XXXX	Major Elective 3	3	
XXXX	Professional Elective 1	3					
TOTAL		11		TOTAL		15	