

# CEC Undergraduate Programs

## Bachelor of Science in Industrial Engineering

The Bachelor of Science in Industrial Engineering is a 4-year undergraduate curriculum that ensures the students' academic success and preparation for a productive industrial engineering career. The objective of the Bachelor of Science in Industrial Engineering is to foster a world-class industrial engineering education in collaboration with industry. The college is committed to graduate competent industrial engineers equipped with the proficiency to adapt to technological and societal changes, and who are poised to excel in the field. The program objectives are:

1. To equip students with a critical understanding of fundamental scientific and engineering principles relevant to industrial systems.
2. To prepare students for successful careers in industrial engineering by equipping them with the necessary skills, competencies, and practical experience relevant to the industry.
3. To Promote teamwork and collaboration with peers from different disciplines, emphasizing the multidisciplinary nature of engineering projects.
4. To foster excellence in the field of industrial engineering by promoting critical thinking, problem-solving, and decision-making skills, as well as instilling strong work ethic, professionalism, and ethical values in students.

The Bachelor of Science in Industrial Engineering curriculum accomplishes the integration of systems using appropriate analytical, computational, and experimental practices and including studies in the social sciences to ensure appropriate sensitivity to socially related problems.

## 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 must 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, analyze and interpret data, 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 Industrial Engineering must complete a minimum of 125 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 (45) 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 Industrial Engineering

Course Code	Course Title	CH	Pre-requisites
<b>General Education Requirements</b>		<b>Total Credits</b>	<b>39</b>
<b>National Requirements</b>		<b>Total Credits</b>	<b>7</b>
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	
<b>English Requirements</b>		<b>Total Credits</b>	<b>6</b>
ENGL 101	Composition I	3	
ENGL 102	Composition II	3	ENGL 101
<b>Mathematics Requirements</b>		<b>Total Credits</b>	<b>8</b>
MATH 153	Calculus I	4	
MATH 154	Calculus II	4	MATH 153
<b>ICT Requirements</b>		<b>Total Credits</b>	<b>3</b>
COSC 101	Introduction to Computing	3	
<b>Lifelong Learning Requirements</b>		<b>Total Credits</b>	<b>1</b>
UNSS 101	University Success	1	
<b>Natural Science Requirements</b>		<b>Total Credits</b>	<b>8</b>
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.			
<b>Arts and Humanities Requirements</b>		<b>Total Credits</b>	<b>3</b>
Students should complete a minimum of 3 credits from the Arts and Humanities list of the general Education tabulated below			
<b>Social and Behavioral Science Requirements</b>		<b>Total Credits</b>	<b>3</b>
Students should complete a minimum of 3 credits, from the Social and Behavioral Science list of the general Education tabulated below.			
<b>Arts and Humanities List</b>			
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	
<b>Natural Sciences List</b>			
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
<b>Social and Behavioral Sciences List</b>			
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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<b>Program Core Requirements</b>	<b>Total Credits</b>	<b>26</b>	
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
<b>Program Major Requirements</b>	<b>Total Credits</b>	<b>45</b>	
MECH 101	Solid Modeling I	3	MATH 153
MECH 204	Thermofluids	2	PHYS 101
MECH 204L	Thermofluids Laboratory	1	Concurrent MECH 204
MATH 260	Probability and Statistics	4	MATH 154
NDSE 301	Operations Research: Modeling	3	MATH 154
NDSE 302	Stochastic and Probability Modeling	4	NDSE 301, MATH 260
NDSE 306	Systems Simulation	3	MATH 260
COSC 390	Introduction to Machine Learning and Data Analytics	3	ENGR 105, MATH 260
NDSE 404	Design and Analysis of Experiments	3	NDSE 301 ENGR 342, COSC 390
NDSE 406	Industrial Engineering Internship	3	Senior Level (81 Credits), CGPA 2.0)
NDSE 412	Facilities Design and Planning	3	ENGR 100
NDSE 415	Supply Chain Management	3	NDSE 412
NDSE 423	Quality Engineering	3	MATH 260
NDSE 481	Safety Engineering	3	ENGR 100
NDSE 499A	Engineering Design: Capstone Project I	2	Senior level (90 credits), CGPA 2.0
NDSE 499B	Engineering Design: Capstone Project II	2	NDSE 499A
<b>Program Major Electives Options</b>	<b>Total Credits</b>	<b>9</b>	
Students pursuing the Bachelor of Science in Industrial 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:			
<b>At least 2 courses from the following:</b>			
MGMT 410	Business Policy and Strategic Management	3	If CBM Student: MGMT 101, minimum 75 credits If CEC Student: ENGR 401, Passing 75 Credits
DSAI 465	Artificial Intelligence	3	If Industrial Engineering Student: DSAI 310 or COSC 390 If Data Science and AI Student: DSAI 310
NDSE 480	Project Management for Engineers	3	ENGR 205, ENGR 342
<b>At most 1 course from the following:</b>			
MECH 341	Manufacturing Processes	3	MECH 241
MGMT 305	International Business	3	If CBM Student: MGMT 205 , ECON 202 If CEC Student: ENGR 100, ENGR 342
MGMT 350	Business Ethics	3	If CBM Student: MGMT 205,co-requisite: ENGL 205 If CEC Student: ENGR 100, ENGR 205
CIVL 355	Environmental Engineering	3	CHEM 101
<b>Professional Elective Options</b>	<b>Total Credits</b>	<b>6</b>	
Students pursuing the Bachelor of Science in Industrial Engineering must complete a minimum of 6 elective credits from general education or any other program at 200 level or above.			
<b>Internship</b>	<b>Total Credits</b>	<b>3</b>	
To qualify for the Bachelor of Science in Industrial 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.			
<b>Program Total Credits</b>		<b>125</b>	

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## Proposed Study Plan (NDSE) - AY 2026 - 2027

### First Year

1 <sup>st</sup> Semester				2 <sup>nd</sup> Semester			
Course Code	Course Title	CH	Pre-requisites	Course Code	Course Title	CH	Pre-requisites
CHEM 101	Introductory Chemistry	3	co-requisite of CHEM 101L	ENGR 100	Introduction to Engineering	1	
CHEM 101L	Introductory Chemistry Laboratory	1	co-requisite of CHEM 101	PHYS 101	Principles of Physics I	3	co-requisite of PHYS 101L
COSC 101	Introduction to Computing	3		PHYS 101L	Principles of Physics I Laboratory	1	co-requisite of PHYS 101
ENGL 101	Composition I	3		ENGL 102	Composition II	3	ENGL 101
UNSS 101	University Success	1		ARHG 106	Modern History of Bahrain	2	
MATH 153	Calculus I	4		XXXX	Arts and Humanities Requirement	3	
				MATH 154	Calculus II	4	MATH 153
TOTAL		15		TOTAL		17	

### Second Year

3 <sup>rd</sup> Semester				4 <sup>th</sup> Semester			
Course Code	Course Title	CH	Pre-requisites	Course Code	Course Title	CH	Pre-requisites
ARHG 104/ARHG 101	Arabic for Arabic Speakers/Arabic for Non-Arabic Speakers	3		MECH 101	Solid Modeling I	3	MATH 153
PHYS 102	Principles of Physics II	3	PHYS 101, PHYS 101L, MATH 153, co-requisite: PHYS 102L	ARHG 107	Human Rights	2	
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
ENGR 105	Programming for Engineers	2	COSC 101	MECH 204	Thermofluids	2	PHYS 101
CIVL 200	Engineering Mechanics - Statics	3	PHYS 101	MECH 204L	Thermofluids Laboratory	1	Concurrent MECH 204
MATH 252	Calculus III	4	MATH 154	MATH 260	Probability and Statistics	4	MATH 154
				ENGR 205	Multidisciplinary Research Methods	2	ENGL 102
TOTAL		16		TOTAL		17	

### Third Year

5 <sup>th</sup> Semester				6 <sup>th</sup> Semester			
Course Code	Course Title	CH	Pre-requisites	Course Code	Course Title	CH	Pre-requisites
XXXX	Professional Elective 1	3		NDSE 302	Stochastic and Probability Modeling	4	NDSE 301, MATH 260
MECH 241	Engineering Materials	2	CIVL 200, CHEM 101	NDSE 306	Systems Simulation	3	MATH 260
NDSE 301	Operations Research: Modeling	3	MATH 154	NDSE 404	Design and Analysis of Experiments	3	NDSE 301, ENGR 342, COSC 390
ENGR 342	Engineering Economic Analysis	3	MATH 154	NDSE 412	Facilities Design and Planning	3	ENGR 100
COSC 390	Introduction to Machine Learning and Data Analytics	3	ENGR 105, MATH 260	NDSE 481	Safety Engineering	3	ENGR 100
ENGR 401	Entrepreneurship for Engineers	2	ENGR 205				
TOTAL		16		TOTAL		16	

### Summer Semester

Course Code	Course Title	CH	Pre-requisites
NDSE 406	Industrial Engineering Internship	3	Senior Level (81 Credits), CGPA 2.0)
TOTAL		3	

### Fourth Year

7 <sup>th</sup> Semester				8 <sup>th</sup> Semester			
Course Code	Course Title	CH	Pre-requisites	Course Code	Course Title	CH	Pre-requisites
NDSE 415	Supply Chain Management	3	NDSE 412	NDSE 499B	Engineering Design: Capstone Project II	2	NDSE 499A
NDSE 423	Quality Engineering	3	MATH 260	XXXX	Major Elective 2	3	
NDSE 499A	Engineering Design: Capstone Project I	2	Senior level (90 credits), CGPA 2.0	XXXX	Major Elective 3	3	
XXXX	Social and Behavioral Science Requirements	3		XXXX	Professional Elective 2	3	
XXXX	Major Elective 1	3					
TOTAL		14		TOTAL		11	