

ELECTRICAL ENGINEERING, BACHELOR OF SCIENCE

The Electrical Engineering program at Hamad Bin Khalifa University (HBKU) offers a comprehensive approach that blends theoretical foundations with practical applications. This approach equips students to tackle contemporary challenges in areas such as information, communication, computing, power, and electrical systems.

With an emphasis on collaborative education, training, research, and capacity-building, the program aims to prepare adaptable engineers, capable of meeting society's evolving needs and embracing leadership, social consciousness, integrity, and ethics.

Requirements

Minimum hours required to complete program 128 CH

Code	Title	Hours
CHEM 127	General Chemistry I	3
CHEM 128	General Chemistry I Laboratory	1
ELEN 209	Computer Programming and Algorithms	4
ELEN 214	Electrical Circuit Theory	4
ELEN 248	Digital Systems Design	4
ELEN 250	Machine Learning for Electrical Engineering	3
ELEN 303	Random Signals and Systems	3
ELEN 314	Signals and Systems	3
ELEN 322	Electric and Magnetic Fields	3
ELEN 325	Electronics	4
ELEN 335	Measurements and Instrumentation	4
ELEN 340	Electric Energy Conversion	4
ELEN 349	Microprocessors and Embedded Systems	4
ELEN 350	Computer Architecture and Design	4
ELEN 370	Physical Properties of Materials	3
ELEN 391	Internship	0
ELEN 403	Senior Design Project I	3
ELEN 404	Senior Design Project II	3
ENGL 114	Composition and Rhetoric	3
ENGL 220	Technical Writing	3
ENGR 110	Introduction to Programming	3
ENGR 210	Introduction to Innovations and Technology Entrepreneurship	1
ENGR 482	Engineering Ethics	3
MATH 161	Engineering Mathematics I	4
MATH 162	Engineering Mathematics II	4
MATH 261	Engineering Mathematics III	3
MATH 318	Differential Equations	3
MATH 321	Topics in Applied Mathematics I	3
PHYS 216	Newtonian Mechanics for Engineering and Science	3
PHYS 217	Electricity and Magnetism for Engineering and Science	3
PHYS 226	Experimental Physics and Engineering Laboratory I: Mechanics	1

PHYS 227	Experimental Physics and Engineering Laboratory II: Electricity and Magnetism	1
Subtotal		95
<i>Technical Area Electives</i>		15

Student must take at least two courses from their chosen concentration (i.e., depth requirement) and at least one course from each of the other technical areas (i.e., breadth requirement)

ELEN 489	Selected Topics in Electrical Engineering	
<i>Technical Area 1 - Power and Energy Systems</i>		
ELEN 410	Automatic Control Systems	
ELEN 412	Power Electronics	
ELEN 414	Electric Power Systems	
ELEN 416	Electric Machines and Drives	
ELEN 418	Renewable Electric Power Systems	
<i>Technical Area 2 - Communications and signal Processing</i>		
ELEN 430	Digital Signal Processing	
ELEN 432	Wireless Communications	
ELEN 434	Radar and Remote Sensing	
ELEN 436	Image Processing	
ELEN 455	Digital Communications	
<i>Technical Area 3 - Embedded and Intelligent Computing Systems</i>		
ELEN 440	Principles of Artificial Intelligence	
ELEN 442	Deep Learning for Robotics	
ELEN 446	VLSI Design	
ELEN 448	CMOS Digital Circuit Design	
<i>University Core Curriculum Areas</i>		18
Student must take required credits from each area		
<i>Area 1: Identity and Communication (6 credits)</i>		
ARAB 150	Arabic for Professional Communication	
COMM 110	Language, Identity, and Communication in Qatar	
COMM 115	Language and Islamic Identities	
ISLM 105	Scriptural Ethics	
<i>Area 4: Social and Behavioral Sciences (3 credits)</i>		
PSYC 101	Introduction to Psychology	
HELT 115	Health and Wellness in Modern Society	
ECON 110	Economic Principles	
POLS 135	International Relations of the Gulf	
POLS 136	Perspectives in Gulf Studies	
POLS 137	Policy Analysis, Design and Implementation	
POLS 140	Global Grand Challenges	
SOCI 101	Introduction to Sociology	
SOCI 105	AI and Society	
SOCI 115	Comparative Theories and Methods	
LAW 103	Law and Technology	
<i>Area 5A: Humanities (3 credits)</i>		
ARAB 152	Arabic Linguistics	
HIST 107	World History	
HUMN 111	Data Methods for Digital Humanities	
ISLM 106	Philosophy, Theology, and Ethics	
FIN 101	Ethical Finance	
HUMN 116	Beyond Oil, Gucci, and Karak	
<i>Area 5B: Creative Expression (3 credits)</i>		
HUMN 105	Global Cinema	
HUMN 113	Art and Visual Culture	
HUMN 114	Cinema and Musical Culture in the Arab World	

ENGL 115	Creative and Digital Writing
ISLM 117	Islamic Art and Architecture
LITR 110	World Literature and the Modern World
<i>Area 6: Leadership and Civic Engagement (3 Credits)</i>	
HUMN 110	Moral Reasoning and Decision-Making
SOCI 111	Community Service and Engagement
SOCI 117	Technology, Innovation, and Society
SOCI 137	Global Citizenship and Social Responsibility
SOCI 140	Global Citizenship through Environmental Humanities
SOCI 142	Impactful Leadership and Social Innovation for a Sustainable Future

Total Hours 128

Freshman

First Semester	Hours	
CHEM 127	General Chemistry I	3
CHEM 128	General Chemistry I Laboratory	1
MATH 161	Engineering Mathematics I	4
ENGR 110	Introduction to Programming	3
ENGL 114	Composition and Rhetoric	3
UCC	Univ. Core Elective	3
Semester Hours		17

Second Semester

PHYS 216	Newtonian Mechanics for Engineering and Science	3
PHYS 226	Experimental Physics and Engineering Laboratory I: Mechanics	1
MATH 162	Engineering Mathematics II	4
ENGL 220	Technical Writing	3
UCC	Univ. Core Elective	3
Semester Hours		14

Sophomore

First Semester	Hours	
PHYS 217	Electricity and Magnetism for Engineering and Science	3
PHYS 227	Experimental Physics and Engineering Laboratory II: Electricity and Magnetism	1
MATH 261	Engineering Mathematics III	3
ELEN 209	Computer Programming and Algorithms	4
ELEN 248	Digital Systems Design	4
ENGR 210	Introduction to Innovations and Technology Entrepreneurship	1
Semester Hours		16

Second Semester

MATH 318	Differential Equations	3
MATH 321	Topics in Applied Mathematics	3
ELEN 214	Electrical Circuit Theory	4
ELEN 250	Machine Learning for Electrical Engineering	3
UCC	Univ. Core Elective	3
Semester Hours		16

Junior

First Semester	Hours	
ELEN 303	Random Signals and Systems	3
ELEN 314	Signals and Systems	3
ELEN 325	Electronics	4
ELEN 349	Microprocessors and Embedded Systems	4
ELEN 370	Physical Properties of Materials	3
Semester Hours		17

Second Semester

ELEN 322	Electric and Magnetic Fields	3
ELEN 335	Measurements and Instrumentation	4
ELEN 340	Electric Energy Conversion	4
ELEN 350	Computer Architecture and Design	4

UCC	Univ. Core Elective	3
Semester Hours		18
Third Semester		
ELEN 391	Internship	0
Semester Hours		0
Senior		
First Semester		
ELEN 403	Senior Design Project I	3
ENGR 482	Engineering Ethics	3
Technical Area Electives		3
Technical Area Electives		3
UCC	Univ. Core Elective	3
Semester Hours		15
Second Semester		
ELEN 404	Senior Design Project II	3
Technical Area Electives		3
Technical Area Electives		3
Technical Area Electives		3
UCC	Univ. Core Elective	3
Semester Hours		15
Total Hours		128