



Website:

<https://www.feng.bu.edu.eg/index.php/programs/special-new-programs/electric-program>

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Electrical Engineering and Control Program

1. Introduction

Electrical Engineering and Control (EEC) program, established in the year 2017. Electrical Engineering as well as Control are among the most exciting and challenging areas of engineering, and are the key disciplines in a highly technological society. Electrical engineers have been driving the evolution of technology by being able to effectively apply fundamental concepts and integrate knowledge from various disciplines while pursuing frontier research, creating new ideas and innovations, and designing and developing new products.

The Electrical Engineering landscape is evolving rapidly and poses many challenges to engineers today. Benha University's EEC undergraduate programs are designed to graduate versatile engineers for immediate employment and to prepare them for challenges ahead.

The program has strong emphasis on scientific and engineering fundamentals and a high degree of flexibility which can provide a wide diversity of educational experiences. It allows the students to plan their individual educational experience in accordance with their career aspirations.

2. Bachelor of Science (B.Sc.) in Electrical Engineering

The undergraduate EEC program leads to the Bachelor of Science Degree with a Major in Electrical Engineering and Control.

3. Vision:

To be innovative pioneers in effective engineering education, and community service in Electrical engineering and Control. The program aspires to be ranked first among all Electrical Engineering programs in the Middle East region.

4. Mission:

The mission statement of the Electrical Engineering and Control program is *"The Electrical Engineering and Control Program is committed to provide a distinguished educational service by graduating engineers who are able to compete at the local and regional levels, and developing research studies thus contributing to spread the values of innovation, entrepreneurship and social responsibility"*.

5. Program Educational Objectives

In line with its missions and visions, the Electrical Engineering and Control program aims to produce electrical engineers with strong foundation in the relevant sciences and technology, who are able to contribute to society through practice, innovation, enterprise and leadership.

The structure of the Electrical Engineering and Control program is designed to meet the following program objectives:

- **Program Objective #1 (PEO1):** Provide a distinguished academic curriculum in accordance with international standards in the field of Electrical Engineering and Control to ensure continuous development and recognize the contemporary scientific issues,
- **Program Objective #2 (PEO2):** Direct students on how to deal with technological developments and work in different societies, which supports their ability to innovate and entrepreneurship,
- **Program Objective #3 (PEO3):** Provide students with the principals of engineering sciences and mathematics to coagulate the basics of electrical engineering and move forward to conduct advanced studies in these fields,
- **Program Objective #4 (PEO4):** Qualify graduates to work not only in the local markets but also at the regional level, especially the Arab world and Africa, in order to achieve economic growth,
- **Program Objective #5 (PEO5):** Develop communication skills and teamwork, taking into account the professional, ethical and social aspects, so that graduates are prepared to take the responsibility and engaged in long-life learning,
- **Program Objective #6 (PEO6):** Provide students with the ability to design renewable-energy power systems and how to install them in remote areas and to develop the optimal method for energy conservation,
- **Program Objective #7 (PEO7):** Prepare a qualified engineer to work in the field of control systems and robotics, and to use the latest technologies in these fields.

6. Graduate Attributes of EEC Program:

These attributes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program. They prepare graduates to attain the program educational objectives

According to the National Academic Reference Standard (NARS2018), the graduates of EEC program must satisfy the following attributes:

1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations;
2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation;
3. Behave professionally and adhere to engineering ethics and standards;
4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance;
5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community;
6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles;
7. Use techniques, skills and modern engineering tools necessary for engineering practice;
8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post-graduate and research studies;
9. Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner;
10. Demonstrate leadership qualities, business administration and entrepreneurial skills.

Besides the above-mentioned general attributes of all Engineering graduates, the Electrical Engineering and Control program's graduates must satisfy the following attributes:

11. Design electrical power systems generated from renewable sources, using technological and professional tools.
12. Gain the skills needed for the job market such as Programmable Logic Controllers (PLC), Advanced Process Control (APC), Distributed Control Systems (DCS) and Supervisory Control and Data Acquisition (SCADA).
13. Use computer software packages in the design and simulation of various control systems as well as the power systems.
14. Testing, maintaining and modifying existing electrical power systems

7. EEC Study Requirements:

The Bachelor of Science in EEC program strives to achieve the aims through a well-structured approach with core, electives and general education modules. The student should complete 175 Credit Hours for graduation. EEC program comprises 7 Modules:

#	Subject Area	Credit Hours	%
A	Humanities and Social Sciences (Univ. Req.)	16	9.14
B	Mathematics and Basic Sciences	39	22.29
C	Basic Engineering Sciences (Faculty/Spec. Req.)	37	21.14
D	Applied Engineering and Design	38	21.71
E	Computer Applications and ICT	16	9.14
F	Projects and Practice	13	7.44
G	Elective Courses	16	9.14
Total		175	100

8. Program Levels and Courses

First Year (Preparatory Year / Zero Level of Program)

• First Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EMP101	Engineering Mathematics (1)	3	2	-	-	4	
EMP103	Physics (1)	3	2	-	3	5	
EMP105	Engineering Chemistry	3	2	-	3	5	
EMP106	Engineering Mechanics (1)	3	2	2	-	4	
MDP101	Engineering Drawing (1)	3	2	-	3	5	
GEN101	English Language	2	2	-	-	2	
Total		17	12	4	9	25	

• Second Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EMP102	Engineering Mathematics (2)	3	2	2	-	4	EMP101
EMP104	Physics (2)	3	2	-	3	5	EMP103
EMP107	Engineering Mechanics (2)	3	2	2	-	4	EMP106
CPE101	Computer Programming	3	2	-	3	5	
MDP103	Production Technology & Workshops	3	2	-	3	5	
MDP102	Engineering Drawing (2)	3	2	-	3	5	MDP101
GEN102	Engineering & Society	2	2	-	-	2	
Total		20	14	4	12	30	Total

Second Year (First Level of Program)

• First Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC211	Electric Circuits (1)	3	2	-	3	5	EMP104
MPE101	Fluid and Thermal Systems	3	2	2	-	4	EMP104
EEC212	Structured Programming	3	2	-	3	5	CPE101
EEC213	Logic Design	3	2	-	3	5	CPE101
EMP201	Engineering Mathematics (3)	3	2	2	-	4	EMP102
GEN201	Technical Report Writing	2	2	-	-	2	GEN101
Total		17	12	4	9	25	

• Second Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC221	Electromagnetics (1)	3	2	2	-	4	EMP104
EEC222	Electric Circuits (2)	4	3	2	-	5	EEC211
EEC223	Electronics (1)	4	2	2	3	7	EEC211
EEC224	Signals and Systems	3	2	2	-	4	EMP201
EMP202	Engineering Mathematics (4)	3	2	2	-	4	EMP201
Total		17	11	10	3	24	

Third Year (Second Level of Program)

• First Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC311	Electronics (2)	3	2	-	3	5	EEC223
EEC312	Electric Machines (1)	3	2	-	3	5	EEC222
EEC313	Electric Power Systems (1)	3	2	2	-	4	EEC222
EEC314	Engineering Mathematics (5)	3	2	2	-	4	EMP202
EEC315	Electronic Measurements	3	2	-	3	5	EEC211
GEN202	Psychology & Organization Behavior	2	2	-	-	2	
Total		17	12	4	9	25	

• Second Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC321	Automatic Control (1)	3	2	2	-	4	EEC224
EEC322	Electromagnetics (2)	2	2	-	-	2	EEC221
EEC323	Electric Machines (2)	4	3	-	3	6	EEC312
EEC324	Communications Systems	3	2	2	-	4	EEC224
EEC325	Engineering Mathematics (6)	3	2	2	-	4	EMP202
GEN301	Leadership and Management Skills	2	2	-	-	2	
Total		17	13	6	3	22	

After completion of this semester, student performs Industrial Training course (INT301) for six weeks during summer for 3 Credit Hours.

Fourth Year (Third Level of Program)

• First Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC411	High Voltage Engineering (1)	3	2	-	3	5	EEC322
EEC412	Industrial Controls (1)	3	2	-	3	5	EEC213/222
EEC413	Power Electronics (1)	4	3	-	3	6	EEC223/222
EEC414	Electric Power Systems (2)	3	2	-	3	5	EEC313
EEC415	Automatic Control (2)	3	2	-	3	5	EEC321
GEN302	Professional Ethics	2	2	-	-	2	
Total		18	13	-	15	28	

• Second Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC421	Microcontrollers	4	3	-	3	6	EEC223/213
EEC422	Digital Control	3	2	-	3	5	EEC415
EEC423	Electric Drive Systems (1)	3	2	-	3	5	EEC323/413
EEC424	Power Electronics (2)	3	2	-	3	5	EEC413
GEN401	Legislations, Contract & Procurement Management	2	2	-	-	2	
Total		15	11	-	12	23	

After completion of this semester, student performs Industrial Training course (INT401) for six weeks during summer for 3 Credit Hours.

Fifth Year (Fourth Level of Program)

• First Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC511	Graduation Project (1)	2	1	-	3	4	120 credit
EEC512	Robotics Engineering (1)	3	2	-	3	5	EEC223
EEC513	Power System Protection (1)	3	2	2	-	4	EEC414
EEC5XX	Select course from "Elective (1)"	3	2	-	3	5	
EEC5XX	Select 2nd course "Elective (1)"	3	2	-	3	5	
EEC5XX	Select course from "Elective (2)"	2	2	-	-	2	
Total		16	11	2	12	25	

• Second Semester:

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC521	Graduation Project (2)	2	-	-	6	6	EEC511
EEC522	Intelligent Control	3	2	-	3	5	EEC415
EEC5XX	Select 3rd course "Elective (1)"	3	2	-	3	5	
EEC5XX	Select 4th course "Elective (1)"	3	2	-	3	5	
EEC5XX	Select 2nd course "Elective (2)"	2	2	-	-	2	
GEN402	Human Resources Management	2	2	-	-	2	
Total		15	10	-	15	25	

Elective Group 1 (students must select 4 courses from that list)

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC551	Industrial Controls (2)	3	2	-	3	5	EEC412
EEC552	Power Electronics (3)	3	2	-	3	5	EEC424
EEC553	Embedded Systems	3	2	-	3	5	EEC421
EEC554	Smart Grid	3	2	-	3	5	EEC424
EEC555	Power System Control	3	2	-	3	5	EEC414/415
EEC556	Robotics Engineering (2)	3	2	-	3	5	EEC511
EEC557	Special Electrical Machines	3	2	-	3	5	EEC323
EEC558	Electrical Drive Systems (2)	3	2	-	3	5	EEC423
EEC559	Protection of Power Systems (2)	3	2	-	3	5	EEC513
EEC560	Electric Power Plants	3	2	-	3	5	EEC414
EEC561	Power Distribution Systems	3	2	-	3	5	EEC313
EEC562	Modern Control Systems	3	2	-	3	5	EEC415
EEC563	High Voltage Engineering (2)	3	2	-	3	5	EEC411
EEC564	Utilization of Electric Energy	3	2	-	3	5	EEC313
EEC565	Renewable Energy Systems	3	2	-	3	5	EEC413
EEC566	Technology of Electric Power Station	3	2	-	3	5	MPE101
EEC567	Selected Topics in Electrical/Control Engineering	3	2	-	3	5	
Total		12	8	-	12	20	

Elective Group 2 (students must select 2 courses from that list)

Code	Course Title	Credit Hours	Contact hours / week				Prerequisite Course(s)
			Lect.	Tut.	Lab.	Total	
EEC568	Management of Energy Resources	2	2	-	-	2	EEC222
EEC569	Operations research	2	2	-	-	2	
EEC570	Management of international business	2	2	-	-	2	
EEC571	Environmental Impacts of Electric Energy	2	2	-	-	2	EEC411
EEC572	Electrical Safety	2	2	-	-	2	
EEC568	Management of Energy Resources	2	2	-	-	2	
Total		4	4	-	-	4	

9. EEC Facilities/Laboratories:

The classrooms are well equipped with all modern audio-visual facilities. The EEC program has well equipped laboratories in different areas. The laboratories are enriched with equipment to cater the needs of students. The program has 9 laboratories that support its educational activities.

Electric Circuits Laboratory	Logic Design Laboratory
Electronic Devices Laboratory	Instrumentation Laboratory
Control Systems Laboratory	Electrical Power Laboratory
Electrical Machine Laboratory	Power Electronics Laboratory
Industrial Control Laboratory	High Voltage Laboratory

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