

Sana'a University
Faculty of Engineering
Electrical Engineering
Department



**Electrical Power
and Machines
Engineering**

Program Specifications

October - 2020

Faculty of Engineering, Sana'a University

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Electrical Power and Machines Engineering Program Specifications

Program Identification and General Information:	
Program Title	Electrical Power and Machines Engineering
Host Element	Sana'a University
Responsible Department	Electrical Engineering Department
Other Departments with major Teaching Contributions	Mechanical Engineering Department, Mechatronics Engineering Department
Media of Instruction	English Language
Mode of Delivery	Semesters
Total credit hours needed for completion of the program	176
Length full time	Five academic years (two terms each - full time)
Award granted on completion of the Program	Bachelor of Science in Electrical Power and Machines Engineering
Location(s) where the program is offered	Inside the University (Eng. Faculty)
Approval date:	October 2020



Vision, Mission & Aims of the Department

Vision

Sustain the leadership locally and be excellence regionally in education and scientific research in the different fields of electrical Engineering.

Mission

Graduate qualified Engineers in Electric Power, communication and computer engineering in accordance with programs committed to the international quality standards. The Graduating Engineers handed with enough knowledge and skills necessary to meet the requirements of development as well as local and regional labor markets. Also, they able to self-development and proceed with contemporary issues. The department contribute to community wellness and the country development through scientific research, advisory services, and training and education programs.

Aims of the Department

1. Graduate high qualified engineers in electrical power, communication and computer engineering able to compete at national and regional levels.
2. Update undergraduate and post graduate programs and enhance the applied research environment to contribute in country development.
3. Establish partnerships with the public and private sectors and provide engineering consultancies, continuous training, teaching and awareness programs.
4. Improve the academic staff to student ratio as per standard.
5. Fill the gap in the number of assistance staff and laboratory technicians and implement training programs to enhance their skills.
6. Commit and uphold high ethical and professional conduct in the education and practice of engineering.

Program Mission

Power Engineering and Electrical Machines program mission is to prepare high qualified graduates in electrical power and machines engineering able to apply engineering principles to solve a wide range of problems in the field of electrical power engineering. In addition, the program is committed to provide continuing education, outreach activities, consulting and research.

Program Aims

1. Work professionally and manage skill fully electrical power industries, including generation, transmission, distribution, electrical machines and drives.
2. Implement knowledge in science, mathematics and computational technology to investigate and solve problems encountered in the electrical power industry.



3. Compete at national and regional levels.
4. Conduct effectively and ethically both as a member of or a leadership of a team in multicultural work atmosphere.
5. Follow lifelong learning and continuously improve their knowledge in the electrical power engineering practice and make contributions to the advance of engineering profession.
6. Realize the impact electrical power industry on the environment.

Graduate Attributes:

In addition to the practical and professional skills of electrical engineering, the graduates of Electrical Power and Machines Engineering program should be able to:

1. Design and manage the construction of power generation and distribution systems.
2. Plan and develop the control and protection of power systems and electrical machines.
3. Evaluate and test the electrical machine performance with its power electronics drive devices.
4. Analyze the load demand and determine the appropriate electric type system for it.

Program Intended Learning Outcomes (PILOs):

A. Knowledge and Understanding:

Upon successful completion of an undergraduate Electrical Power and Machines Engineering, the graduates will be able to:

- A1: Demonstrate an understanding of related knowledge in mathematics and science related to Power Engineering and Electrical Machines.
- A2: Understand principles of design including elements, processes and/or systems related to Power Engineering and Electrical Machines.
- A3: Acquire knowledge of contemporary issues.
- A4: Understand professional and ethical responsibilities.

B. Intellectual/ Cognitive Skills

Upon successful completion of an undergraduate Electrical Power and Machines Engineering, the graduates will be able to:

- B1: Identify, formulate and solve engineering problems related to Power Engineering and Electrical Machines.
- B2: Analyze, interpret and evaluate data.



B3: Analyze electrical engineering systems and processes using appropriate software and techniques.

B4: Consider economic, social and environmental dimensions in engineering design related to Power Engineering and Electrical Machines.

C. Professional and Practical Skills

Upon successful completion of an undergraduate Electrical Power and Machines Engineering, the graduates will be able to:

C1: Apply acquired knowledge in mathematics and science in solving engineering problems related to Power Engineering and Electrical Machines.

C2: Design, model and simulate electrical systems to meet desired needs within realistic constraints.

C3: Conduct tests related to electrical engineering practice and interpret data.

C4: Use modern engineering techniques, skills and computing tools related to Power Engineering and Electrical Machines.

D. General / Transferable Skills

Upon successful completion of an undergraduate Electrical Power and Machines Engineering, the graduates will be able to:

D1: Work effectively within teams.

D2: Engage in independent lifelong learning.

D3: Adopt professional and ethical responsibilities.

D4. Communicate effectively both orally and in written forms.

D5. Conduct searches of literature

D6. Conduct searches of literature and use databases and other sources of information.

System of Study

Terms of study.

Specify the structure of the academic year of study in the program, does it follow a year or semester, Total Credit hours), mode of delivery etc.,

Semester System

١٧٦ Hours

Study Credit.

Specify the program structure and the distribution of Credit and average for each component of the program. Therefore, the program structure should specify:

Total number of hours; core requirements; elective requirements, particularly any restriction on electives; the minimum and/or maximum credit points of certain elements of the program where applicable; the requirements for activities such as field studies or professional practice, and Specify how to calculate the student GPA, etc.

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Program Requirement	%
• University Requirements.	17 Hours 9.7%
• Faculty Requirements.	14 Hours 8%
• Basic Requirements	24 Hours 13.6%
•	
1. Admission Requirements: Specify the criteria as part of the admission process, such as percentage of secondary school, audition, placement tests, or interview.	
1- High School Certificate with not less than 80 % passing ratio.	
2- Screening test	
3- Student number capacity of 100 students per year	
2. Degree Requirements The purpose of this section is to describe how the way in which students progress through the program relates to the development/ achievement of the learning. (Progression Requirements in order to proceed to the next year or to obtain a degree).	
Year 1 to year 2:	Total Credit Hours for Year 1 (36 Hours)
Year 2 to year 3	Total Credit Hours for Year 2 (36 Hours)
Year 3 to year 4:	Total Credit Hours for Year 3 (36 Hours)
Year4 to year 5:	Total Credit Hours for Year 4 (36 Hours)
Year5 to obtain Degree	Total Credit Hours for Year 5 (36 Hours)
The specification of the degree requirements, which a student must fulfill in order to be eligible to graduate. E.g. total number of credit hours; GPA required for graduation, What awaits him/her if he/she did not achieve the accumulative GPA in semester or year ? If a student got an Academy leave, or stop the study in the program for whatever reason, what are the requirements for continuing his/her study in the program again?, If the current version of the program is different from the previous one, where he/she studied, how you will deal with him/her with regard to the requirements of graduation?, What are the requirements for graduation from the program for the student transferring from another program, from the same university or from another university? Etc..	

Course Coding Abbreviations:

E-stands for Electrical Engineering Department
 EE-stands for common courses between the programs
 EPM-stands for Electrical Power and Machine Engineering Program
 CN-stands for Communication and Network Engineering Program
 CC-stands for Computer and Control Engineering Program
 UR-stands for university requirement

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FR-stands for faculty requirement
 BR- stands for department requirement
 ME-stands for courses offered by Mechanical Engineering Department

Study Plan 2020

The structure and content of the program should be consistent with the University's policy Structure and Requirements of the Awarded Bachelor's Degree and related to University policies.

Study Plan by Requirements:

University Requirements

No	Course No.	Course Name	اسم المقرر	CH	L	T	P
				س. م	م	ت	ع
1	UR001	Arabic Language 1	لغة عربية ١	2	2	0	0
2	UR002	English Language 1	لغة انجليزية ١	2	2	0	0
3	UR003	Computer Skills	مهارات حاسوب	3	2	0	2
4	UR004	Arabic Language 2	لغة عربية ٢	2	2	0	0
5	UR005	English Language 2	لغة انجليزية ٢	2	2	0	0
6	UR006	Islamic Culture	ثقافة اسلامية	2	2	0	0
7	UR007	Arabic Israel Conflict	الصراع العربي الاسرائيلي	2	2	0	0
8	UR008	National Culture	الثقافة الوطنية	2	2	0	0
Total				17	16	0	2

Faculty Requirements

No	Course No.	Course Name	اسم المقرر	CH	L	T	P
				س. م	م	ت	ع
1	FR001	Mathematics 1	رياضيات ١	3	2	2	0
2	FR002	Engineering Physics	فيزياء هندسية	4	2	2	2
3	FR003	Mathematics 2	رياضيات ٢	3	2	2	0
4	FR304	Engineering Project Management	إدارة مشاريع هندسية	2	1	2	0

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5	FR305	Entrepreneurship & Communication Skill	ريادة اعمال ومهارات تواصل	2	1	2	0
Total				14	8	10	2

Basic Requirements

No	Course No.	Course Name	اسم المقرر	CH	L	T	P
				س. م.	م	ت	ع
1.	BR002	Engineering Workshop	ورش هندسية	3	2	0	2
2.	BR003	Engineering Drawing	رسم هندسي	3	1	0	4
3.	BR007	Engineering Mechanics	ميكانيكا هندسية	3	2	2	0
4.	BR111	Scientific English	انجليزي علمي	2	2	0	0
5.	BR112	Technical Writing	تقارير فنية	2	2	0	0
6.	BR121	Linear Algebra	جبر خطي	3	2	2	0
7.	BR122	Differential Equations	معادلات تفاضلية	3	2	2	0
8.	BR223	Engineering Mathematics	رياضيات هندسية	3	2	2	0
9.	BR232	Engineering Economy	اقتصاد هندسي	2	0	0	0
Total				24	15	8	6

Elective Subjects

No.	Elective No.	Course Name	اسم المقرر	Credit CH	Lec.	Tu.	Pr.	Level/Semester	CODE
1.	Elective 1	Artificial Intelligence	الذكاء الاصطناعي	٣	٢	٢	٠	4 th Level/1 st Semester	CCE326
		Illumination	الاضاءة	٣	٢	٢	٠		PME344
2.	Elective 2	Planning and Operation of Electrical Power Systems	تخطيط وتشغيل نظم القوى الكهربائية	٣	٢	٢	٠	5 th Level/1 st Semester	PME435
		Electrical Power Quality	جودة القوى الكهربائية	٣	٢	٢	٠		PME447
3.	Elective 3	Communications for Electrical Power Systems	الاتصالات لنظم القوى الكهربائية	٣	٢	٢	٠	5 th Level/2 nd Semester	CNE438
		Introduction to Robotics	مقدمة في الروبوتات	٣	٢	٢	٠		CCE437



Course Plan / First Year

Year	Semester	Course code	Course Name	اسم المقرر	Credit CH	Lec.	Tu.	Pr.	Pre-Requ.	Co-Requ.	
First Year	First Semester	BR00۲	Engineering Workshop	ورش هندسية	3	2	0	2	NA	(blank)	
		FR002	Engineering Physics	فيزياء هندسية	4	2	2	2		(blank)	
		FR001	Mathematics 1	رياضيات ١	3	2	2	0		(blank)	
		UR001	Arabic Language ١	لغة عربية ١	2	2	0	0		(blank)	
		UR002	English Language ١	لغة انجليزية ١	2	2	0	0		(blank)	
		UR003	Computer Skills	مهارات حاسوب	3	2	٠	2		(blank)	
		UR008	Arabic Israeli Conflict	الصراع العربي الاسرائيلي	2	2	0	0		(blank)	
	First Semester Total					19	١٤	٤	٦		
	Second Semester	BR00٣	Engineering Drawing	الرسم الهندسي	3	1	0	4	NA	(blank)	
		BR007	Engineering Mechanics	ميكانيكا هندسية	3	2	2	0		(blank)	
		FR003	Mathematics 2	رياضيات ٢	3	2	2	0		(blank)	
		UR004	Arabic Language ٢	لغة عربية ٢	2	2	0	0		(blank)	
		UR005	English Language ٢	لغة انجليزية ٢	2	2	0	0		(blank)	
		UR006	Islamic Culture	ثقافة إسلامية	2	2	0	0		(blank)	
UR008		National Culture	الثقافة الوطنية	2	2	0	0	(blank)			
Second Semester Total					17	١٣	٤	٤			
First Year Total					36	٢٧	٨	١٠			



Course Plan / Second Year

Year	Semester	Course code	Course Name	اسم المقرر	Credit CH	Lec.	Tu.	Pr.	Pre-Requ.	Co-Requ.	
Second Year	First Semester	BR111	Scientific English	انجليزي علمي	2	2	0	0			
		BR121	Linear Algebra	جبر خطي	3	2	2	0			
		PME111	Electrical Circuits ١	دوائر كهربائية ١	4	2	2	2			
		CCE141	Programming Language ١ (Python)	لغة برمجة ١ (بايثون)	3	2	٠	٢			
		CCE١18	Logic Circuits	دوائر منطقية	3	2	0	2			
		ME1٥٠	Thermodynamics	ديناميكا حرارية	3	2	٢	٠			
	First Semester Total					18	12	6	6		
	Second Semester	BR112	Technical Report Writing	كتابة تقارير فنية	2	2	0	0			
		BR122	Differential Equations	معادلات تفاضلية	3	2	2	0			
		PME112	Electrical Circuits ٢	دوائر كهربائية ٢	4	2	2	2			
		PME113	Electronics ١	الالكترونيات ١	4	2	2	2			
		CCE143	Programming Language ٢ (C/C++)	لغة برمجة ٢ (سي/سي++)	3	2	٠	٢			
		CNE١13	Fields Theory	نظرية مجالات	3	2	2	0			
	Second Semester Total					19	12	8	6		
Second Year Total					37	24	14	12	Second Year Total		



Course Plan / Third Year

Year	Semester	Course Code	Course Name	اسم المقرر	Credit CH	Lec.	Tu.	Pr.	Pre-Requ.	Co-Requ.	
Third Year	First Semester	BR223	Engineering Mathematics	رياضيات هندسية	3	2	2	0			
		CNE214	Signals and Systems	إشارات ونظم	٣	2	٠	2			
		PME214	Electronics ٢	الالكترونيات ٢	4	2	2	2			
		PME221	Electrical Machines ١	الات كهربائية ١	4	2	2	2			
		PME241	Electrical Installation	التمديدات الكهربائية	3	2	٠	٢			
		BR232	Engineering Economy	اقتصاد هندسي	2	٢	0	0			
	First Semester Total					19	١٢	٦	8		
	Second Semester	PME222	Renewable Energy Technology	تقنيات الطاقة المتجددة	3	2	2	0			
		PME223	Electrical Measurements and Instrumentations	القياسات الكهربائية وتجهيزاتها	4	2	2	2			
		PME224	Electrical Machines ٢	الات كهربائية ٢	4	2	2	2			
		PME231	Power Transmission Systems	نظم نقل الطاقة	3	2	2	0			
		PME244	Power Electronics	الالكترونيات قوى	4	2	2	2			
	Second Semester Total					18	10	10	6		
	Third Year Total					٣7	22	١٦	14	Third Year Total	



Course Plan / Fourth Year

Year	Semester	Course code	Course Name	اسم المقرر	Credit CH	Lec.	Tu.	Pr.	Pre-Requ.	Co-Req.	
Fourth Year	First Semester	CCE334	Embedded Systems	أنظمة مدمجة	3	2	0	2			
		PME326	Special Machines	الات خاصة	4	2	2	2			
		CCE331	Analog Control Systems	نظم التحكم التماثلي	4	2	2	2			
		PME343	Power Generation Plants	محطات توليد كهربائية	3	2	2	0			
		XXE3XX	Elective Course 1	مقرر اختياري ١	3	2	2	0			
		PME345	Industrial Safety	الامان الصناعي	3	2	2	0			
	First Semester Total					20	12	10	6	First Total	
	Second Semester	CCE332	Digital Control Systems	نظم التحكم الرقمي	3	2	2	0			
		PME346	Industrial Automation	التحكم الصناعي	3	2	0	2			
		FR30٤	Engineering Project Management	إدارة مشاريع هندسية	2	1	2	0			
		FR305	Entrepreneurship & Communication Skills	ريادة أعمال ومهارات اتصال	2	2	0	0			
		PME327	Electrical Drives	محركات كهربائية	4	2	2	2			
		PME332	Power System Analysis ١	تحليل نظم قوى ١	3	2	2	0			
Second Semester Total					17	11	8	4			
Fourth Year Total					37	23	18	10	Fourth Year Total		



Course Plan / Fifth Year

Year	Semester	Course Code	Course Name	اسم المقرر	Credit CH	Lec.	Tu.	Pr.	Pre-Requ.	Co-Requ.
		PME333	Power System Analysis ٢	تحليل نظم قوى ٢	3	2	2	0		
		PME415	Graduate Project ١	مشروع التخرج ١	٢	2	0	٠		
		PME446	High Voltage Engineering	جهد عالي	3	2	2	0		
		PME428	Substation Design	تصميم محطات التحويل	3	2	2	0		
		PME434	Power Distribution Systems	نظم توزيع الطاقة	3	2	2	0		
		PME4XX	Elective Course ٢	(مقرر اختياري ٢)	3	2	2	0		
First Semester Total					١٧	12	10	0	First Total	
	Second Semester	PME416	Industrial Training	تدريب صناعي	3	1	0	4		
		PME415	Graduate Project ٢	مشروع التخرج ٢	3	2	٢	٠		
		PME436	Power System Protection	وقاية أنظمة القوى	4	2	2	2		
		XXE4XX	(Elective Course ٣)	١ (مقرر اختياري ٣)	3	2	2	0		
Second Semester Total					13	7	6	6	Second Total	
Fifth Year Total					٣٠	19	16	6	Fifth Year Total	
Program Total CH					177	١١٥	72	٥٢	Grand Total	