German Jordanian University

School of Sustainable Systems Engineering
Department of Electrical and Energy Engineering
Bachelor of Science in Energy Engineering

Study Plan 2025

I. Program Objectives

The Electrical and Energy Engineering department's programs emphasizes the application of technologies and tools in the short term, and the ability to discover, acquire, and adapt new knowledge and skills in the long term, such that our graduates are prepared to:

a. Provide the technical knowledge of electrical and energy engineering aspects and principles, along with the required supporting knowledge of mathematics, science and computing fundamentals. Emphasis is made on the specialty areas of Energy and Electrical engineering.
b. Develop the skills needed to perform and design experimental projects. Develop the ability to formulate problems and projects, and to plan a solution process deploying diverse technical knowledge and skills.
c. Develop the ability to organize and present information effectively whether orally, written or visual.
d. Provide sufficient breadth and depth for successful subsequent graduate study and lifelong learning.
e. Provide an appreciation for the broad spectrum of issues arising in professional practice, including teamwork, leadership, safety, ethics, service, economics, and professional organizations.

II. Learning Outcomes

Energy Engineering provides bachelor's students with an understanding of fundamental engineering and management concepts, methodologies, and technologies as demonstrated by:

a. An ability to apply knowledge of mathematics, science and engineering.
b. An ability to design and conduct experiments, as well as to analyze and interpret data.
c. An ability to design a system, component, or process to meet desired needs.
d. An ability to function in teams.
e. An ability to identify, formulate and solve engineering problems.
f. An understanding of professional and ethical responsibility.
g. An ability to communicate effectively.
h. A broad education is necessary to understand the impact of electrical engineering solutions in a global and societal context.
i. A recognition of the need for an ability to engage in life-long learning.
j. A knowledge of contemporary issues.
k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Course Delivery Methods

Courses are in one of the following three methods:

- **Face-to-Face (F2F) Method**
  Courses that are taught through face-to-face learning and are delivered at the university campus.
- **Blended (BLD) Method**
  Courses in which teaching consists of face-to-face learning and asynchronous E-learning. The face-to-face learning takes place at the university campus. Asynchronous E-learning takes place through activities, tasks, educational duties, and assignments through the virtual E-learning platforms (Moodle and MyGJU) without direct meetings with course instructors.
- **Online (OL) Method**
  Courses in which teaching consists of synchronous E-learning and asynchronous E-learning. The synchronous E-learning takes place through interactive virtual meetings between instructors and students directly through the virtual E-learning platform (MS Teams). The asynchronous E-learning takes place through activities, tasks, educational duties, and assignments through the virtual E-learning platforms (Moodle and MyGJU) without direct meetings with course instructors.

III. Admission Requirements

To apply for admission, the following minimum requirements must be met:

a. General secondary school certificate with a minimum score of 80%

Placement Tests

Applicants must sit for placement tests in the Arabic Language, the English Language, and Mathematics to determine whether the applicant may be required to take remedial courses in the mentioned subjects. Depending on or the applicant scores in the placement tests, some of the following 3-credit-hour remedial courses are required:

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
ARB0099	Elementary Arabic	3	3	3	-	OL	Placement test
ENGL0098	Elementary English	3	3	3	-	F2F	Placement test
ENGL0099	Intermediate English	3	3	3	-	F2F	ENGL0098
MATH0099	Pre-Math	3	3	3	-	OL	Placement test
	Total	**12**	**12**	**12**	**0**		

- Remedial courses are to be completed and passed within the first year of enrollment.
- Passing grade of remedial courses is 60%.
- ECTS (B.Sc.): is the European Credit Transfer and Accumulation, One ECTS is equivalent to 30 actual workload hours.

IV. Degree Requirements

The requirements to obtain a B.Sc. degree in Energy Engineering are the following:

a. Complete the 168-credit hour program.
b. A minimum of 12 credit hours of elective courses are to be taken at a partner university in Germany.
c. Complete Field Training.
d. Complete International Internship.

V. Framework for B.Sc. Degree (Credit hours)

Classification	Credit Hours			ECTS		
	Compulsory	Elective	Total	Compulsory	Elective	Total
University Requirements	21	6	27			
School Requirements	37	0	37			
Program Requirements	92	12	104			
Total	**150**	**18**	**168**			

Course Delivery Method	Credit Hours	Percentage
Online Courses	24	14%
Blended Courses	52	31%
Face-to-Face Courses	92	55%
Total	**168**	**100%**

1. University Requirements: (27 credit hours)

1.1. Compulsory: (21 credit hours)

Course ID	Course Name		Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
					Lect.	Prac.		
ARB100	Arabic		3	3	3	-	OL	ARB0099
ENGL1001	Upper-Intermediate English		3	3	3	-	F2F	ENGL0099
ENGL1002	Advanced English		3	3	3	-	F2F	ENGL1001
GERL101B1	German I B1-Track		3	6	9	-	F2F	-
GERL102B1	German II	B1-Track	3	6	9	-	F2F	GERL101B1
GERL102B2		B2-Track						
MILS100	Military Science		3	2	3	-	OL	-
NE101	National Education		3	2	3	-	OL	-
NEE101	National Education in English							
		Total	**21**	**25**	**33**	**0**		

1.2. Elective: (6 credit hours)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
-	University Elective 1	2	2	1	1	BLD	-
-	University Elective 2	2	2	1	1	BLD	-
-	University Elective 3	2	2	1	1	BLD	-
	Minimum required	**6**	**6**	**3**	**3**		

https://www.gju.edu.jo/content/department-basic-education-18102

School Requirements: (37credit hours)

Course ID	Course Name		Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
					Lect.	Prac.		
CHEM103	General Chemistry I		3	5	3	-	F2F	-
CS116	Computing Fundamentals		3	5	3	-	F2F	-
CS1160	Computing Fundamentals lab		1	2	-	3	BLD	CS116[co]
GERL201B1	German III	B1-Track	3	4	6	-	F2F	ARB0099, ENGL0099, GERL102B1 or GERL102B2
GERL201B2		B2-Track						ARB0099, ENGL0099, GERL102B2
GERL202B1	German IV	B1-Track	3	6	9	-	F2F	ARB0099, ENGL0099, GERL201B1 or GERL201B2
GERL202B2		B2-Track						ARB0099, ENGL0099, GERL201B2
IE0141	Engineering Workshop		1	4	-	3	BLD	-
IE0281	Technical Writing and Engineering Ethics		2	3	2	-	F2F	ENGL1001
MATH101	Calculus I		3	5	3	-	BLD	MATH0099
MATH102	Calculus II		3	5	3	-	F2F	MATH101
MATH203	Applied Mathematics for Engineers		3	5	3	-	F2F	ARB0099, ENGL0099, MATH102
MATH205	Differential Equations		3	5	3	-	F2F	ARB0099, ENGL0099, MATH102
ME0111	Computer Aided Engineering Drawing		2	4	-	6	BLD	CS116
PHYS103	Physics I		3	5	3	-	BLD	-
PHYS104	Physics II		3	5	3	-	F2F	PHYS103
PHYS106	General Physics Lab		1	2	-	3	BLD	PHYS103, PHYS104[co]
		Total	**37**	**65**	**41**	**15**		

2. Program Requirements (104 credit hours)

2.1. Program Requirements (Compulsory): (92 credit hours)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites`
				Lect.	Prac.		
EE2101	Electrical Circuits	3	5	3	-	F2F	ARB0099, ENGL0099, PHYS104, MATH205[co]
EE2102	Electrical Circuits Lab	1	2	-	3	BLD	ARB0099, ENGL0099, EE2101, PHYS106
EE2103	Linear Algebra	3	5	3	-	BLD	ARB0099, ENGL0099, MATH102
EE2104	Frequency and System Response	3	5	3	-	F2F	ARB0099, ENGL0099, EE2101
EE2105	Electronics	3	5	3	-	F2F	ARB0099, ENGL0099, EE2101
EE2106	Electronics Lab	1	2	-	3	BLD	ARB0099, ENGL0099, EE2102, EE2105
EE2107	Computer Aided Mathematics for EE	2	4	0	6	BLD	ARB0099, ENGL0099,

								CS1160, MATH205, EE2103[co]
EE3101	Random Variables and Stochastic Processes		3	5	3	-	BLD	MATH102
EE3102	Electromagnetics		3	5	3	-	F2F	MATH203, EE2104
EE3103	Modeling and Simulation of Electrical and Energy Systems		1	-	2	3	BLD	EE3401[co], EE3201[co]
EE3104	Artificial Intelligence in Electrical and Energy Systems		3	5	3	-	F2F	EE2107, EE2103
EE3201	Electrical Power and Machines		3	5	3	-	F2F	EE2104, EE3102[co]
EE3202	Electrical Power and Machines Lab		1	2	-	3	BLD	EE2102, EE3201
EE3203	Power Electronics		3	5	3	-	BLD	EE2105, EE3201
EE3204	Power Electronics Lab		1	2	-	3	BLD	EE2106, EE3203
EE3401	Communication Systems and IoT Protocols		3	3	3	-	BLD	EE2104
EE3402	Communication Systems and IoT Protocols Lab		1	2	-	3	BLD	EE3401, CE201
EE3901	Field Training[a]		0	6	160 hours		F2F	Dept. Approval
EE4901	International Internship[b]		12	30	20 weeks		OL	EE3901, Dept. Approval
EE5101	Control Systems		3	5	3	-	BLD	EE2103, EE3201
EE5201	Power Systems Analysis		3	5	3	-	F2F	EE2107, EE3201
EE5202	Power System Generation, Transmission and Distribution		3	5	3	-	F2F	EE2103
EE5203	Power Systems Lab		1	2	-	3	BLD	EE5202
EE5204	Motor Drives Systems		3	5	3	-	BLD	EE3203
EE5301	Fundamentals and Applications of Renewable Energy		3	3	3	-	F2F	MECH2201, EE3203
EE5302	Energy Storage and Carriers		3	5	3	-	BLD	EE5301, CHEM103
EE5303	Sustainable Energy Lab		1	2	-	3	BLD	EE5301
EE5901	Graduation Project I [c]		1	4	-	3	BLD	Dept. Approval
EE5902	Graduation Project II		3	6	-	9	BLD	EE5901
CE212	Digital Systems		3	5	3	-	F2F	ARB0099, ENGL0099, CS116
GERL301B1	German V	B1-Track	3	6	9	-	F2F	GERL202B1 or GERL202B2
GERL301B2		B2-Track						GERL202B2
GERL302B1	German VI	B1-Track	3	6	6	-	F2F	GERL301B1 or GERL301B2
GERL302B2		B2-Track						GERL301B2
IE0361	Engineering Economics		3	5	3	-	OL	MATH205
MECH2201	Applied Thermodynamics		3	5	3	-	F2F	ARB0099, ENGL0099, MATH102
MECH2202	Fluid Flow and Heat Transfer		3	5	3	-	F2F	ARB0099, ENGL0099, MECH2201
		Total	**92**	**172**	**77**	**42**		

[a] The EE3901 field training course should be registered after completing at least 115 credit hours. The minimum number of training hours is 160 hours and should be performed should be connected without any gaps.
[b] The International Internship is prerequisite to all elective courses if registered in Jordan.

F2F: Face-to-face BLD: Blended OL: Online co: Corequisite

2.2. Program Requirements (Electives): (12 credit hours)

A minimum of 12 credit hours of coursework are required. This list is open for modifications based on school council decisions.

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
EE4101	Modeling and Simulation	3	5	3	-	F2F	BSC001
EE4102	Instrumentation and Measurements	3	5	3	-	F2F	BSC001
EE4103	Electronic Circuit Design	3	5	3	-	F2F	BSC001
EE4106	Introduction to Optimization	3	5	3	-	F2F	BSC001
EE4107	Special Topics in Electrical Systems	3	5	3	-	F2F	BSC001
EE4108	Special Topics in Electronics	3	5	3	-	F2F	BSC001
EE4201	Switched Mode Power Supplies	3	5	3	-	F2F	BSC001
EE4202	Special Electrical Machines	3	5	3	-	F2F	BSC001
EE4203	Power Semiconductor Devices	3	5	3	-	F2F	BSC001
EE4204	Power Systems Operation and Control	3	5	3	-	F2F	BSC001
EE4205	Mixed Signal Test Engineering	3	5	3	-	F2F	BSC001
EE4206	Smart-Grids	3	5	3	-	F2F	BSC001
EE4207	High Voltage Engineering	3	5	3	-	F2F	BSC001
EE4208	Advanced Power Converters	3	5	3	-	F2F	BSC001
EE4209	Power System Quality	3	5	3	-	F2F	BSC001
EE4210	Power Electronic Applications in Power Systems	3	5	3	-	F2F	BSC001
EE4211	Power System Protection	3	5	3	-	F2F	BSC001
EE4212	Power System Stability	3	5	3	-	F2F	BSC001
EE4213	Power System Reliability	3	5	3	-	F2F	BSC001
EE4214	Power System Integration	3	5	3	-	F2F	BSC001
EE4215	Special Topics in Power Electronics	3	5	3	-	F2F	BSC001
EE4216	Special Topics in Power Systems	3	5	3	-	F2F	BSC001
EE4301	Solar Energy	3	5	3	-	F2F	BSC001
EE4302	Thermal and Hydrodynamic equipment	3	5	3	-	F2F	BSC001
EE4303	Heating Ventilating and Air Conditioning (HVAC)	3	5	3	-	F2F	BSC001
EE4304	Turbomachinery	3	5	3	-	F2F	BSC001
EE4305	Geothermal and Hydropower systems	3	5	3	-	F2F	BSC001
EE4306	Fuel Cell & Hydrogen Production Technology	3	5	3	-	F2F	BSC001
EE4307	Bio-Energy Technology	3	5	3	-	F2F	BSC001
EE4308	Techno-economics of energy systems	3	5	3	-	F2F	BSC001
EE4309	Advanced Renewable Energy Systems	3	5	3	-	F2F	BSC001
EE4310	Environmental and Energy Engineering	3	5	3	-	F2F	BSC001
EE4311	Low Carbon Buildings	3	5	3	-	F2F	BSC001
EE4312	Applied Refrigeration	3	5	3	-	F2F	BSC001
EE4313	Energy Audit	3	5	3	-	F2F	BSC001
EE4314	Energy Efficiency, Management, and Laws	3	5	3	-	F2F	BSC001
EE4315	PV Systems	3	5	3	-	F2F	BSC001
EE4316	Wind Energy Systems	3	5	3	-	F2F	BSC001

EE4317	Power Plants Engineering	3	5	3	-	F2F	BSC001
EE4318	Data Analytics for Power and Energy Systems	3	5	3	-	F2F	BSC001
EE4319	Special Topics Renewable Energy	3	5	3	-	F2F	BSC001
CE441	Embedded System Design	3	5	3	-	F2F	BSC001
CEE553	Building Physics	3	5	3	-	BLD	BSC001
CEE572	Environmental and Water Law and Policy	3	5	3	-	BLD	BSC001
CEE596	Advanced topics in Project Management	3	5	3	-	BLD	BSC001
IE0417	Business and Labor Law	3		3	-	F2F	BSC001
IE0515	Product Development and Entrepreneurship	3	5	3	-	F2F	BSC001
IE0516	Facilities and Asset Management	3	5	3	-	F2F	BSC001
IE0533	Supply Chain Engineering	3	5	3	-	F2F	BSC001
IE0562	Industrial Cost Analysis	3	5	3	-	F2F	BSC001
MECH4214	Thermal Management of Electronic Systems	3	5	3	-	F2F	BSC001
MECH4407	Failure Analysis	3	5	3	-	F2F	BSC001
MECH4410	Six Sigma	3	5	3	-	F2F	BSC001
MECH5501	Heating Ventilation and Air Conditioning	3	5	3	-	F2F	BSC001
MECH5606	Hybrid and Electric Vehicles	3	5	3	-	BLD	BSC001
MGT418	Quality Management	3	5	3	-	F2F	BSC001
	Total	**12**	**20**	**12**	**0**		

Study Plan[c] Guide for a B.Sc. Degree in Energy Engineering

First Year							
First Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
CHEM103	General Chemistry I	3	5	3	-	F2F	-
CS116	Computing fundamentals	3	5	3	-	F2F	-
ENGL1001	Upper-Intermediate English	3	3	3	-	F2F	ENGL0099
GERL101	German I	3	6	9	-	F2F	-
MATH101	Calculus I	3	5	3	-	BLD	MATH0099
PHYS103	Physics I	3	5	3	-	BLD	-
	Total	**18**	**29**	**24**	**0**		

First Year							
Second Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
ARB100	Arabic	3	3	3	-	OL	ARB0099
CS1160	Computing fundamentals lab	1	2	-	3	BLD	CS116[co]
ENGL1002	Advanced English	3	3	3	-	F2F	ENGL1001
GERL102	German II	3	6	9	-	F2F	GERL101
MATH102	Calculus II	3	5	3	-	F2F	MATH101
ME0111	Computer Aided Engineering Drawing	2	4	0	6	BLD	CS116
PHYS104	Physics II	3	5	3	-	F2F	PHYS103
	Total	**18**	**28**	**21**	**9**		

[c] The following study plan guide does not take into account possible remedial courses.

F2F: Face-to-face BLD: Blended OL: Online co: Corequisite

Second Year							
First Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
EE2101	Electrical Circuits	3	5	3	-	F2F	ARB0099, ENGL0099, PHYS104, MATH205^{co}
GERL201	German III	3	3	6	-	F2F	ARB0099, ENGL0099, GERL102
IE0281	Technical Writing and Engineering Ethics	2	3	2	-	F2F	ENGL1001
MATH203	Applied Mathematics for Engineers	3	5	3	-	F2F	ARB0099, ENGL0099, MATH102
MATH205	Differential equations	3	5	3	-	F2F	ARB0099, ENGL0099, MATH102
NE101	National Education (in Arabic) National Education (in English)	3	2	3	-	OL	-
PHYS106	General Physics Lab	1	2	-	3	BLD	PHYS103 ,PHYS104^{co}
	Total	**18**	**25**	**20**	**3**		

Second Year							
Second Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
EE2102	Electrical Circuits Lab	1	2	-	3	BLD	ARB0099, ENGL0099, EE2101, PHYS106
EE2103	Linear Algebra	3	5	3	-	BLD	ARB0099, ENGL0099, MATH102
EE2104	Frequency and System Response	3	5	3	-	F2F	ARB0099, ENGL0099, EE2101
EE2105	Electronics	3	5	3	-	F2F	ARB0099, ENGL0099, EE2101
EE2107	Computer Aided Mathematics for EE	2	4	0	6	BLD	ARB0099, ENGL0099, CS1160, MATH205, EE2103^{co}
CE212	Digital Systems	3	5	3	-	F2F	ARB0099, ENGL0099, CS116
GERL202	German IV	3	6	9	-	F2F	ARB0099, ENGL0099, GERL201
	Total	**18**	**32**	**21**	**9**		

F2F: Face-to-face BLD: Blended OL: Online co: Corequisite

Third Year							
First Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
EE3101	Random Variables and Stochastic Processes	3	5	3	-	BLD	MATH102
EE3102	Electromagnetics	3	5	3	-	F2F	MATH203, EE2104
EE3201	Electrical Power and Machines	3	5	3	-	F2F	EE2104, EE3102^{co}
EE3401	Communication Systems and IoT Protocols	3	3	3	-	BLD	EE2104
GERL301	German V	3	6	9	-	F2F	GERL202
MECH2201	Applied Thermodynamics	3	5	3	-	F2F	ARB0099, ENGL0099, MATH102
	Total	**18**	**29**	**24**	**0**		

Third Year							
Second Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
EE2106	Electronics Lab	1	2	-	3	BLD	ARB0099, ENGL0099, EE2102, EE2105
EE3103	Modeling and Simulation of Electrical and Energy Systems	1	2	-	3	BLD	EE3401^{co}, EE3201^{co}
EE3104	Artificial Intelligence in Electrical and Energy Systems	3	5	3	0	F2F	EE2107, EE2103
EE3202	Electrical Power and Machines Lab	1	2	-	3	BLD	EE2102, EE3201
EE3203	Power Electronics	3	5	3	-	BLD	EE2105, EE3201
EE3402	Communication Systems and IoT Protocols Lab	1	2	-	3	BLD	EE3401, CE201
GERL302	German VI	3	6	6	-	F2F	GERL301
MECH2202	Fluid Flow and Heat Transfer	3	5	3	-	F2F	ARB0099, ENGL0099, MATH205, MECH2201
	University Elective I	2	2	1	1	BLD	-
	Total	**18**	**31**	**16**	**13**		

Third Year							
Summer Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
EE3901	Field Training	0	6	160 hours		F2F	Dept. Approval
	Total	**0**	**6**				

F2F: Face-to-face BLD: Blended OL: Online co: Corequisite

Fourth Year							
First Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
	Electives	3	5	3	-	F2F	BSC001
	Electives	3	5	3	-	F2F	BSC001
	Electives	3	5	3	-	F2F	BSC001
	Electives	3	5	3	-	F2F	BSC001
	Total	**12**	**20**	**12**			

Fourth Year							
Second Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
EE4901	International Internship[d]	12	30	20 weeks		OL	EE3901, Dept. Approval
	Total	**12**	**30**				

Prerequisite courses for the German year

Passing the following courses:

- EE3203 Power Electronics
- EE3401 Communication Systems and IoT Protocols

[d]Courses attended and/or passed during International Internship are not transferable

Fifth Year							
First Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
EE3204	Power Electronics Lab	1	2	-	3	BLD	EE2106, EE3203
EE5301	Fundamentals and Applications of Renewable Energy	3	3	3	-	F2F	MECH2201, EE3203
EE5101	Control Systems	3	5	3	-	BLD	EE2103, EE3201
EE5202	Power System Generation, Transmission and Distribution	3	5	3	-	F2F	EE2103
EE5204	Motor Drives Systems	3	5	3	-	BLD	EE3203
EE5901	Graduation Project I	1	4	-	3	F2F	Dept. Approval
IE0361	Engineering Economics	3	5	3	-	OL	MATH205
	University Elective II	2	5	3	-	BLD	-
	Total	**19**	**34**	**18**	**6**		

Fifth Year							
Second Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect.	**Prac.**		
EE5201	Power Systems Analysis	3	5	3	-	F2F	EE2107, EE3201
EE5203	Power Systems Lab	1	2	-	3	BLD	EE5202
EE5302	Energy Storage and Carriers	3	5	3	-	BLD	EE5301, CHEM103
EE5303	Sustainable Energy Lab	1	2	-	3	BLD	EE5301
EE5902	Graduation Project II	3	6	-	9	F2F	EE5901
IE0141	Engineering Workshop	1	4	-	3	BLD	-
MILS100	Military Sciences	3	2	3	-	OL	Only for Jordanian
	University Elective III	2	5	3	-	BLD	-
	Total	**17**	**31**	**12**	**18**		

VI. Compulsory Courses Offered by Electrical and Energy Engineering Department

EE2101 Electrical Circuits **3 Cr Hr (3,0)** **5 ECTS**

SI units, voltage and current; Ohm's and Kirchhoff's Laws, circuits with dependent sources; simple resistive circuits: series, parallel and delta to wye; techniques of circuit analysis: nodal and mesh analyses, source transformation, Thevenin and Norton equivalents; amplifiers; inductance, capacitance and mutual inductance; natural and step responses of RL and RC circuits; natural and step response of series and parallel RLC circuits; sinusoidal steady state analysis.

Prerequisites: ARB0099, ENGL0099, *PHYS104*
Corequisites: MATH205

EE2102 Electrical Circuits Lab **1 Cr Hr (0,3)** **2 ECTS**

Resistive circuits, potentiometers, superposition, Thevenin theorem, maximum power transfer, RLC current and voltage characteristics, frequency response of RL and RC circuits, series and parallel resonant circuits.

Prerequisites: ARB0099, ENGL0099, EE2101, PHYS106

EE2103 Linear Algebra **3 Cr Hr (3,0)** **5 ECTS**

Introduction to Vectors and Matrices. Vector and matrix derivatives. Systems of linear equations. Vector spaces and subspaces. Independence, bases and dimensions. The fundamental four spaces. Orthogonality and Gram-Schmidt process. Projection and projection matrices. Linear models and least squares problems. Determinants and their properties. Eigenvalues and eigenvectors. Matrix decompositions such as LU decomposition, Eigen-decomposition, Singular Value Decomposition. Applying these tools in a wide range of engineering applications.

Prerequisites: ARB0099, ENGL0099, MATH102

EE2104 Frequency and System Response **3 Cr Hr (3,0)** **5 ECTS**

This course focuses on the analysis and modeling of continuous-time signals and electrical systems using time- and frequency-domain techniques. It covers signal properties, linear time-invariant system modeling, convolution, Laplace transforms with Laplace-domain circuit analysis, Fourier series and Fourier transforms, frequency response, and impulse and step responses of electrical circuits. The course also includes the design and analysis of passive and active filters and the introduction of two-port network parameters.

Prerequisites: ARB0099, ENGL0099, EE2101

EE2105 Electronics **3 Cr Hr (3,0)** **5 ECTS**

Semiconductor material, covalent bond model, doping, PN junction, the diode (IV-characteristics, reverse behavior, zero and forward biasing, ideal and real diode), Zener diode, Schottky diode, diode circuit analysis, half-wave rectifier circuits, full-wave rectifier circuits, dynamic switching behavior of the diode, diode applications, Bipolar Junction Transistor (BJT) (NPN and PNP transistors, iv-characteristics, DC analysis (Q-point) & AC small-signal analysis), Field- Effect Transistors (FETs) (Junction FET (JFET) transistor, Metal-Oxide Semiconductor FET (MOSFET) transistor) and i-v characteristics of FET transistors, DC analysis (Q-point) & AC small-signal analysis. Ideal Operational Amplifiers (Op-amps) and their applications.

Prerequisites: ARB0099, ENGL0099, EE2101

EE2106 Electronics Lab **1 Cr Hr (0,3)** **2 ECTS**

Diode circuits, DC and AC characteristics of BJT and FET amplifiers, operational amplifiers and applications, Lab project.

Prerequisites: ARB0099, ENGL0099, EE2102, EE2105

EE2107 Computer Aided Mathematics for EE **2 Cr Hr (0,6)** **4 ECTS**

This course introduces computational tools and programming-based workflows that support mathematical

modeling and analysis in modern engineering practice. Emphasis is on Python fundamentals and their application to data preprocessing, numerical analysis, and visualization. Core topics include solving algebraic and nonlinear equations, interpolation and curve fitting, numerical differentiation and integration, basic optimization techniques, and matrix-based computations. Learning is reinforced through hands-on laboratory exercises and mini projects using real-world engineering datasets, with an emphasis on reproducible analysis, design, visualization, and technical reporting.

Prerequisites: - ARB0099, ENGL0099, CS1160, MATH205
Corequisites: EE2103

EE3101 Random Variables and Stochastic Processes **3 Cr Hr (3,0)** **5 ECTS**

Fundamentals of probability, sample space, random variables expectations, Bernoulli and Poisson processes, continuous single random variable, PDF, CDF and conditional distributions, famous distributions (Gaussian, uniform, exponential, etc), transformation of random variables, joint random variables operations, joint PDF and joint CDF, random processes temporal characteristics and concepts of stationarity, ergodicity and correlation. Introduction to the basics of statistics, descriptive statistics, and hypothesis testing.

Prerequisites: - MATH102

EE3102 Electromagnetics **3 Cr Hr (3,0)** **5 ECTS**

Electrostatic fields, magneto-static fields, solution of Laplace's and Poisson's equations, Faraday's law and applications, Maxwell's equations, plane waves: propagation, reflection and refraction, transmission lines.

Prerequisites: MATH203, EE2104

EE3103 Modeling and Simulation of Electrical and Energy Systems **1 Cr Hr (0,3)** **2 ECTS**

Introduction to modeling methods and simulation techniques for electrical and energy systems. Covers component modeling, system optimization, and computational tools, with applications to electrical and energy systems.

Corequisites: EE3401, EE3201

EE3104 Artificial Intelligence in Electrical and Energy Systems **3 Cr Hr (3,0)** **5 ECTS**

Introduction to AI and machine learning methods for modeling, monitoring, control, optimization, and decision-making in modern electrical and energy engineering applications. The course covers data-driven fundamentals (data preparation, feature engineering, model validation), supervised and unsupervised learning, and selected deep learning approaches, with emphasis on practical engineering workflows, interpretability, and reliability. The course highlights various communication, networking, power and energy applications such as wireless channel/traffic characterization, adaptive resource allocation, signal classification, load and energy generation forecasting and management, condition monitoring and predictive maintenance, and smart grids.

Prerequisites: EE2107, EE2103

EE3201 Electrical Power and Machines **3 Cr Hr (3,0)** **5 ECTS**

Average, reactive and complex power, power measurements; polyphase circuits, Transformers, DC machines, induction motors, synchronous machines.

Prerequisites: EE2104
Corequisites: EE3102

EE3202 Electrical Power and Machines Lab **1 Cr Hr (0,3)** **2 ECTS**

Transformers, DC motors and generators, induction motors, three-phase synchronous generator and motor, AC series motor, lab project.

Prerequisites: EE2102, EE3201

EE3203 Power Electronics **3 Cr Hr (3,0)** **5 ECTS**

Power semiconductor devices: types, drive circuits, protection circuits, and power loss calculation; AC-DC converters: uncontrolled and fully-controlled single-phase and three-phase rectifiers, half-controlled rectifiers; DC-DC converters: step-down, step-up, and step-down/up converters; DC-AC converters: single-phase and three-phase

inverters; AC-AC converters: cycloconverters, ac voltage controllers.

Prerequisites: EE2105, EE3201

EE3204 Power Electronics Lab **1 Cr Hr (0,3)** **2 ECTS**

Uncontrolled single phase half wave rectifier, uncontrolled single phase full wave rectifier, uncontrolled three phase rectifiers, controlled single phase rectifiers, controlled three phase rectifiers, DC chopper (buck converter), DC chopper (boost converter), DC chopper (buck boost converter), single phase AC inverter, lab project.

Prerequisites: EE2106, EE320*3*

EE3401 Communication Systems and IoT Protocols **3 Cr Hr (3,0)** **3 ECTS**

This course introduces the fundamental principles of communication systems and modern Internet of Things (IoT) applications. It begins with a review of basic signals and systems, followed by core topics in analog and digital communications, including amplitude and angle modulation, signal spectra, signal-to-noise ratio, sampling, quantization, line coding. The architecture, layers, and design principles of IoT systems, device-to-device communication, network protocols, and cloud integration. Major IoT communication technologies such Wi-Fi, Bluetooth Low Energy, LoRaWAN, 5G/6G IoT, ZigBee, NB-IoT, and industrial protocols, the trade-offs in terms of energy efficiency, coverage, scalability, interoperability, and security. Some practical case studies will be demonstrated as smart cities, healthcare, industrial automation, environmental monitoring, and smart energy systems.

Prerequisites: EE2104

EE3402 Communication Systems and IoT Protocols lab **1 Cr Hr (0,3)** **2 ECTS**

This laboratory provides practical, hands-on experience through implementation and measurement on real hardware. Students build and test basic analog and digital communication experiments including AM/FM concepts, spectral analysis, SNR measurements, sampling and quantization effects, and basic line-coding. The lab also emphasizes embedded IoT prototyping: interfacing sensors with microcontrollers, configuring device-to-device links, and deploying IoT connectivity using technologies such as Wi-Fi, BLE, LoRaWAN, ZigBee.

Prerequisites: EE3401, CE201

EE3901 Field Training **160 hours** **6 ECTS**

Students must complete 160 hours of field training in approved industries in Jordan.

Prerequisites: Dept. Approval

EE4901 International Internship **12 Cr Hr (0,0)** **30 ECTS**

A training period of six months to be spent in the industry in Germany, under a follow up of academic faculty in Jordan and in Germany. Periodic reports and a final report need to be submitted for evaluation and an oral examination is required.

Prerequisites: Dept. Approval

EE5101 Control Systems **3 Cr Hr (3,0)** **5 ECTS**

This course emphasizes modeling, analysis, and design of control systems for electrical engineering applications. Building on prior coursework in signals and systems and electrical machines, it covers transfer functions, block diagrams, signal flow graphs, and state-space representations of electrical circuits, power electronic converters, and electromechanical systems. Time-domain and frequency-domain analysis, root locus techniques, and compensation design (PI, PID, and lead–lag controllers) are applied to closed-loop control of electrical drives, power systems, and resonant systems, supporting core electrical engineering design competencies.

Prerequisites: EE2103, EE3201

EE5201 Power Systems Analysis **3 Cr Hr (3,0)** **5 ECTS**

Fault analysis, symmetrical components, unsymmetrical faults, transient stability, economic dispatch and operation.

Prerequisites: EE2107, EE3201

EE5202 Power System Generation, Transmission and Distribution **3 Cr Hr (3,0)** **5 ECTS**

Substation design, distribution systems, transmission systems, transformers, high voltage cables, introduction to power system protection, circuit breakers, switch gear, introduction to power quality, wiring and grounding.

Prerequisites: EE2103

EE5203 Power Systems Lab **1 Cr Hr (0,3)** **2 ECTS**

Transmission line performance under different operating conditions, load characteristics, real and reactive power flow and control for a transmission line, characteristics of different types of sequence components, balanced and unbalanced faults, power system transients and stability.

Prerequisites: EE5202

EE5204 Motor Drives Systems **3 Cr Hr (3,0)** **5 ECTS**

DC-motor drives using controlled AC-DC converters; DC-motor drives using DC-DC converters; frequency-controlled induction-motor drives; slip energy recovery; synchronous motor drives using inverters and cycloconverters; variable reluctance drives: switched reluctance and stepper-motor drives using bridge inverters.

Prerequisites: EE3203

EE5301 Fundamentals and Applications of Renewable Energy **3 Cr Hr (3,0)** **3 ECTS**

This course introduces the principles, technologies, and applications of renewable energy systems, with emphasis on solar, wind, biomass, hydro, and emerging sustainable sources. Students will study the fundamentals of energy conversion, system design, and resource assessment, alongside economic, environmental, and policy considerations. Practical applications, case studies, and simulation tools are integrated to provide a balanced understanding of both technical and real-world aspects of renewable energy deployment.

Prerequisites: MECH2201, EE3203

EE5302 Energy Storage and Carriers **3 Cr Hr (3,0)** **5 ECTS**

This course introduces the principles and technologies of energy storage and carriers, with emphasis on their role in modern energy systems. Topics include electrochemical storage (batteries, supercapacitors), mechanical and thermal storage, hydrogen and synthetic fuels as energy carriers, and their integration with renewable energy and smart grids. Economic, environmental, and safety aspects are also discussed.

Prerequisites: EE5301, CHEM103

EE5303 Sustainable Energy Lab **1 Cr Hr (0,3)** **2 ECTS**

This course focuses on the assessment and application of renewable energy systems, including wind, solar radiation, solar thermal, photovoltaic, biomass, and hydro technologies. Students will learn measurement and data collection techniques to evaluate resource availability, system performance, and site-specific feasibility.

Prerequisites: EE5301

EE5901 Graduation Project I **1 Cr Hr (0,3)** **4 ECTS**

This course provides students with the opportunity to prepare and execute an engineering project under faculty supervision. Working in teams, students will select and define a project scope, review the relevant theory and background, and develop an understanding of the practical applications. Emphasis is placed on teamwork, project management, and awareness of ethical and professional issues in engineering practice. The course culminates in a final written report and formal presentation demonstrating the project's outcomes.

Prerequisites: Dept. Approval

EE5902 Graduation Project II **3 Cr Hr (0,9)** **6 ECTS**

This course focuses on the practical implementation of the project approved in the initial phase of the graduation project sequence. Under faculty supervision, students apply engineering principles, analysis, and design to realize

their proposed solutions. The course concludes with a comprehensive final report and a formal presentation summarizing the project results and contributions.

Prerequisites: EE5901

VII. Elective Course Offered by Electrical and Energy Engineering Department

EE4101 Modeling and Simulation **3 Cr Hr (3,0)** **5 ECTS**

This course introduces modeling and simulation techniques for analyzing electrical and energy engineering systems. It focuses on developing component- and system-level models, selecting appropriate modeling assumptions, and translating physical behavior into mathematical and computational representations. Topics include numerical simulation workflows such as discretization, solving algebraic and differential equation models, parameter estimation, and model validation. Emphasis is placed on using simulation to predict system behavior, evaluate performance under different operating conditions, and support engineering design decisions, with practical case studies and software-based implementation.

Prerequisites: BSC001

EE4102 Instrumentation and Measurements **3 Cr Hr (3,0)** **5 ECTS**

Introduction to the fundamentals of engineering instrumentation and measurement. Topics include measurement principles and standards, calibration, accuracy and uncertainty analysis, and sensors/transducers for common physical quantities (e.g., electric, temperature, pressure, flow, displacement, and motion). It also covers signal processing (amplification and filtering), noise and interference mitigation, and basic data acquisition concepts such as sampling, quantization, and digitization.

Prerequisites: BSC001

EE4103 Electronic Circuit Design **3 Cr Hr (3,0)** **5 ECTS**

Feedback amplifiers, oscillators, power amplifiers, current mirrors, active loads, differential amplifiers, active filters, internal structure of operational amplifiers, integrated analog circuits and applications.

Prerequisites: BSC001

EE4106 Introduction to Optimization **3 Cr Hr (3,0)** **5 ECTS**

This course introduces core optimization principles and techniques. It emphasizes converting real problems into well-defined optimization models and solving them using both analytical tools and numerical algorithms. Topics include unconstrained optimization, first- and second-order optimality conditions, gradient-based methods, convexity and introductory convex optimization, and constrained optimization using Lagrange multipliers and KKT conditions. Algorithms such as gradient descent, Newton's method, line search, penalty/barrier methods, and basic linear programming are presented alongside practical implementation using numerical computing tools. The course highlights applications drawn from real-world scenarios.

Prerequisites: BSC001
Corequisites: -

EE4107 Special Topics in Electrical Systems **3 Cr Hr (3,0)** **5 ECTS**

A course on special topics in Electrical Systems

Prerequisites: BSC001

EE4108 Special Topics in Electronics **3 Cr Hr (3,0)** **5 ECTS**

A course on special topics in Electronics.

Prerequisites: BSC001
Corequisites: -

EE4201 Switched Mode Power Supplies **3 Cr Hr (3,0)** **5 ECTS**

Power capabilities and switching speeds of power semiconductors; DC-DC switched-mode converters: types, design, control, applications; DC-AC switched-mode inverters: types, design, control of AC output, applications; computer simulation of switched-mode converters.

Prerequisites: BSC001

EE4202 Special Electrical Machines **3 Cr Hr (3,0)** **5 ECTS**

Linear Electric machines: comparison with rotating machines; linear induction motors: simplified electromagnetic field theory, force equation, characteristics; superconducting AC generators and motors; variable reluctance motors: performance and characteristics; printed circuit motors.

Prerequisites: BSC001

EE4203 Power Semiconductor Devices **3 Cr Hr (3,0)** **5 ECTS**

Carrier transport physics, breakdown phenomenon in semiconductor devices, power bipolar transistors, thyristors, power Junction Field-Effect Transistors (JFET), power diodes, power Metal-Oxide-Semiconductor Field-Effect Transistors (MOSFET), power MOS-bipolar devices.

Prerequisites: BSC001

EE4204 Power Systems Operation and Control **3 Cr Hr (3,0)** **5 ECTS**

General characteristics of modern power systems, evolution of power systems, power system control. Equipment characteristics and modeling, control of protective functions, modeling of excitation system. Prime mover and energy supply systems. Control of active and reactive power; modern stability of power systems; linear and nonlinear systems.

Prerequisites: BSC001

EE4205 Mixed Signal Test Engineering **3 Cr Hr (3,0)** **5 ECTS**

Mixed signal testing, the test specification process, DC and parametric measurements, measurement accuracy, tester hardware, sampling theory, DSP-based testing, analog channel testing, digital channel testing, design for test, data analysis, test economics.

Prerequisites: BSC001

EE4206 Smart-Grids **3 Cr Hr (3,0)** **5 ECTS**

This course presents a new concept in power systems, by integrating Power systems with Power electronics, Communications and information technology. In addition, the concept of involving intelligent control using SCADA system will be presented.

Prerequisites: BSC001

EE4207 High Voltage Engineering **3 Cr Hr (3,0)** **5 ECTS**

Generation and measurement of high voltage, electrostatic field and field stress control, electrical breakdown in gases, solids and liquids, non-destructive insulation test techniques, over-voltages and insulation coordination.

Prerequisites: BSC001

EE4208 Advanced Power Converters **3 Cr Hr (3,0)** **5 ECTS**

This course covers the analysis and design of advanced power electronic converter topologies for modern energy conversion applications. Topics include advanced DC–DC, AC–DC, DC–AC, and multilevel converters, modulation and control techniques, and the use of modern power semiconductor devices. Applications in renewable energy systems, electric vehicles, motor drives, and smart grids are emphasized.

Prerequisites: BSC001

EE4209 Power System Quality **3 Cr Hr (3,0)** **5 ECTS**

Power quality concepts, wiring and grounding issues, voltage sags, voltage variations, transients, harmonics, longer duration voltage variation, distributed generation and power electronics, instrumentation and analyzers.

Prerequisites: BSC001

EE4210 Power Electronic Applications in Power Systems **3 Cr Hr (3,0)** **5 ECTS**

Semiconductor devices for power engineering applications, common power electronic circuits, impact of power electronics loads on power quality, HVDC converter plant, transmission plant control strategies, flexible AC transmission: conventional and advanced devices, shunt compensation, static VAR compensation, series compensation, angle compensation, quadrature boosters, unified power flow controller.

Prerequisites: BSC001

EE4211 Power System Protection **3 Cr Hr (3,0)** **5 ECTS**

Power system protection, fault analysis, instrument transformers, overcurrent protection, distance protection, differential protection, pilot protection, generator protection, motor protection, transmission line protection, transformer protection, bus protection, radial reactor and shunt capacitor protection.

Prerequisites: BSC001

EE4212 Power System Stability **3 Cr Hr (3,0)** **5 ECTS**

Power system stability concepts, the classical machine model, modeling of synchronous machines, modeling of loads, excitation system types, dynamic models of excitation system, response of a power network to disturbances, small signal stability, voltage stability.

Prerequisites: BSC001

EE4213 Power System Reliability **3 Cr Hr (3,0)** **5 ECTS**

Power system reliability concepts, modern random processes methods, the universal generating function method, Monte Carlo simulation, reliability of generation systems, reliability assessment of transmission lines, reliability assessment of transformers, and reliability of distribution systems.

Prerequisites: BSC001

EE4214 Power System Integration **3 Cr Hr (3,0)** **5 ECTS**

This course introduces the principles and challenges of integrating power electronic converters, renewable energy sources, energy storage, and distributed generation into modern power systems. Topics include grid connection requirements, power quality, stability, protection, and basic grid codes, with applications in smart grids, microgrids, and electric power networks.

Prerequisites: BSC001

EE4215 Special Topics in Power Electronics **3 Cr Hr (3,0)** **5 ECTS**

A course on special topics in Power Electronics

Prerequisites: BSC001

EE4216 Special Topics in Power Systems **3 Cr Hr (3,0)** **5 ECTS**

A course on special topics in Power Systems

Prerequisites: BSC001

EE4301 Solar Energy **3 Cr Hr (3,0)** **5 ECTS**

This course explores solar thermal and photovoltaic systems, focusing on heat transfer processes, materials, and design methodologies. Topics include selective coatings, phase change materials, and transparent insulation, as well as testing and performance evaluation of solar collectors. Applications such as solar water heating, absorption cooling, thermal power generation, and photovoltaic-hybrid units are examined. Students will use software tools for system simulation and design, while also considering financial and environmental impacts. Case studies and practical exercises provide applied experience in analyzing and developing solar energy systems.

Prerequisites: BSC001

EE4302 Thermal and Hydrodynamic equipment **3 Cr Hr (3,0)** **5 ECTS**

Covers the design, operation, maintenance, and selection of key thermal and fluid-handling equipment used in energy and process systems. Topics include boilers, heat exchangers, piping systems and fittings, burners, and pumps, with emphasis on performance analysis, efficiency improvement, and safe operation.

Prerequisites: BSC001

EE4303 Heating Ventilating and Air Conditioning (HVAC) **3 Cr Hr (3,0)** **5 ECTS**

Psychometric principles, thermal comfort, air conditioning processes, inside and outside design conditions, heating load calculations, infiltration, cooling load calculations, solar gain, design of heating and air conditioning systems, HVAC equipment and components.

Prerequisites: BSC001

EE4304 Turbomachinery **3 Cr Hr (3,0)** **5 ECTS**

Impulse and reaction turbines, velocity diagrams, energy equations and degree of reaction, total pressure correlation, turbine design, three-dimensional analysis, free vortex design, estimation of stage and design point performance.

Prerequisites: BSC001

EE4305 Geothermal and Hydropower systems **3 Cr Hr (3,0)** **5 ECTS**

Introduces the principles, technologies, and applications of geothermal and hydropower energy systems. Geothermal topics include exploration and drilling techniques, reservoir physics, well test analysis, monitoring, direct and indirect utilization, modeling and visualization, and the design, sizing, and environmental impacts of geothermal power plants and heat pump systems. Hydropower topics cover mini, small, and large-scale plants, resource assessment, dam design, mechanical and electrical components, economic analysis, and environmental considerations.

Prerequisites: BSC001

EE4306 Fuel Cell & Hydrogen Production Technology **3 Cr Hr (3,0)** **5 ECTS**

Fundamentals of fuel cells & hydrogen production technology, basic structure of fuel cells, operations and conversion of chemical potential energy into electrical energy, evaluation of the cell performance, and characterization.

Prerequisites: BSC001

EE4307 Bio-Energy Technology **3 Cr Hr (3,0)** **5 ECTS**

Introduces biomass and its role in low-carbon energy systems, including biopower, bioheat, and biofuels. Examines feedstock conversion technologies, scale-up for industrial production, and applications of end products. Covers sustainability concepts, life cycle analysis (LCA), and the contribution of bioenergy systems to building a low-carbon economy and society.

Prerequisites: BSC001

EE4308 Techno-economics of energy systems **3 Cr Hr (3,0)** **5 ECTS**

This course examines the economic and technical dimensions of modern energy systems, covering both conventional and renewable generation. Topics include cost and performance metrics for utility-scale plants, design parameters for installation and operation, hybrid and integrated energy systems, energy storage technologies, and building/system-level applications. Emphasis is placed on techno-economic feasibility studies, funding mechanisms, environmental impact assessment, energy consumption analysis, and the development of strategies for efficiency improvement and cost reduction.

Prerequisites: BSC001

EE4309 Advanced Renewable Energy Systems **3 Cr Hr (3,0)** **5 ECTS**

Analysis of alternative and renewable energy systems; methods of integrating these solutions with society; sustainable energy; principles, possibilities, and limits of alternative and renewable energy.

Prerequisites: BSC001

EE4310 Environmental and Energy Engineering **3 Cr Hr (3,0)** **5 ECTS**

Environmental issues associated with human activity; mass and energy transfer, environmental chemistry, water and air pollution, pollutant transport modeling, pollution management, and risk assessment, and global

atmospheric change; physical, chemical, and biological systems relating to the quality of water, land and air environments; topics relating energy to environmental engineering including: carbon production, heat and energy transfer and thermal pollution.

Prerequisites: BSC001

EE4311 Low Carbon Buildings **3 Cr Hr (3,0)** **5 ECTS**

Low carbon buildings; methods for balancing architectural and human requirements; relationship between building design and: thermal comfort inside the building, lighting performance, heating, cooling and lighting loads; psychrometric chart to analyze climate and human comfort; the effects of common passive solar strategies on building design; different thermal comfort models; determine the thermal and lighting performance of a building using manual methods and software; appropriate passive solar and low energy design strategies; assess solar access at a site using manual methods; energy assessment tools for building simulation; energy efficiency techniques in the residential sector.

Prerequisites: BSC001

EE4312 Applied Refrigeration **3 Cr Hr (3,0)** **5 ECTS**

Vapor compression cycle; alternative cycles: absorption cycle, multiple effect cycles, ejector cycles, expansion cycles, electric and magnetic cycles; refrigerants: the properties, refrigerant mixtures, refrigeration system components.

Prerequisites: BSC001

EE4313 Energy Audit **3 Cr Hr (3,0)** **5 ECTS**

Covers lighting fundamentals, energy utilities and rates, and methods for identifying efficiency opportunities in buildings. Topics include the scientific principles of energy, light, and heat; energy codes and standards; and metering and monitoring practices. The course also examines the economic, regulatory, and infrastructure issues influencing the adoption of energy efficiency measures, highlighting their role in addressing energy and environmental challenges.

Prerequisites: BSC001

EE4314 Energy Efficiency, Management, and Laws **3 Cr Hr (3,0)** **5 ECTS**

This course explores the technical and physical processes of energy use across the residential, commercial, industrial, and transport sectors. It introduces economic tools for evaluating and justifying energy efficiency investments, alongside “whole-system” design and analysis approaches. Policy frameworks, legal considerations, and environmental requirements are examined to support the effective implementation and management of energy efficiency measures.

Prerequisites: BSC001

EE4315 PV Systems **3 Cr Hr (3,0)** **5 ECTS**

Study of solar radiation, PV cell principles, and system components. Topics include design and analysis of stand-alone and grid-connected PV systems, performance evaluation, and economic considerations. Laboratory work covers PV module testing and small-scale system design.

Prerequisites: BSC001

EE4316 Wind Energy Systems **3 Cr Hr (3,0)** **5 ECTS**

Introduction to wind energy conversion systems, covering wind resource assessment, aerodynamics of wind turbines, power curves, and system components. Emphasis on design and analysis of onshore and offshore wind farms, integration with electrical grids, and environmental and economic considerations. Laboratory work includes performance evaluation of small-scale wind turbines and simulation of wind power systems.

Prerequisites: BSC001

EE4317 Power Plants Engineering **3 Cr Hr (3,0)** **5 ECTS**

Introduction to power plants engineering, energy: A Measure for work potential, gas power cycles, vapor and combined power cycles, thermal power plant components, steam and gas turbine, steam

generators, condenser and condensate, feed-water systems compressors, pumps

Prerequisites: BSC001

EE4318 Data Analytics for Power and Energy Systems **3 Cr Hr (3,0)** **5 ECTS**

This course introduces data analytics methods and workflows for power and energy systems. It covers data acquisition and preprocessing (cleaning, missing data, outliers, normalization), exploratory analysis and visualization, and feature engineering for time-series measurements such as load, voltage/current, power quality, and renewable generation. Topic covers statistical modeling and machine learning techniques used in power and energy applications, with emphasis on model validation, performance metrics, and interpretability.

Prerequisites: BSC001

EE4319 Special Topics Renewable Energy **3 Cr Hr (3,0)** **5 ECTS**

A course on special topics in Renewable Energy

Prerequisites: BSC001

VIII. Course Offered by Other Departments

CEE553 Building Physics **3 Cr Hr (3,0)** **5 ECTS**

This course introduces the fundamentals of building physics with a focus on heat, air, light, and moisture transfer in the built environment. Topics include thermal comfort, energy efficiency, insulation, ventilation, acoustics, and daylighting. Students will learn to analyze building performance, evaluate sustainable design strategies, and apply building physics principles to improve occupant comfort and reduce environmental impact. Case studies and practical examples connect theory with real-world building design and operation.

Prerequisites: BSC001

CEE572 Environmental and Water Law and Policy **3 Cr Hr (3,0)** **5 ECTS**

An overview of the history and current application of laws and rules used to protect the environment. This course outlines the general framework of legislation and includes specific discussions of regulations as they are enforced at international, national, state and local levels. The Environmental Regulations course is concerned with Industry and its relationship with the environment and community and the impact of environmental regulations on Industry decision-making. Topics include waste minimization, pollution prevention, hazardous, special, industrial and municipal solid waste control, the Clean Air Act, and Clean Water Act, and the Occupational Safety and Health Act and how it relates to environmental regulations. Act and how it relates to environmental regulations.

Prerequisites: BSC001

CEE596 Advanced topics in Project Management **3 Cr Hr (3,0)** **5 ECTS**

The course requires candidates to study in detail the way in which the principles of the whole project life cycle including design, production and operation in construction can be integrated. It embraces study of the general principles of systems integration and their application in a construction manufacture context. It also entails study of the fundamental principles of simultaneous engineering and addresses the issue of integration through a technology driven approach; and any advanced topic in project management the instructor may choose.

Prerequisites: BSC001

IX. Courses offered by Other Schools

ARB0099 Elementary Arabic **3 Cr Hr (3,0)** **3 ECTS**

This course aims to develop student's ability to read, comprehend, literary analyze, grammatically analyze, linguistically analyze, poetically analyze, and rhetorically analyze texts properly. The course also includes a selection of Arabic literature in poetry and prose representing different literary ages, in addition to several common forms of writing such as scientific article, news article, and others.

Prerequisites: Placement test

ARB100 Arabic **3 Cr Hr (3,0)** **3 ECTS**

This course aims to improve the student's competence in the various linguistic skills in terms of reading, comprehension, and taste. This is achieved through the study of selected texts with many implications that raise issues in spelling, grammar, composition, meaning, and inference, and the use of an old and modern thesaurus.

Prerequisites: ARB0099

CE212 Digital Systems **3 Cr Hr (3,0)** **5 ECTS**

Fundamentals of digital electronics, Binary number system; Boolean algebra, logic operations, algebra and gates, digital circuits analysis, gate-level and block level design of digital circuits, adders, subtractors, comparators, multiplexers, decoders, analysis, design and applications of sequential circuits: flip-flops, registers, counter, and their design procedures, RAM and ROM memory elements.

Prerequisites: ARB0099, ENGL0099,CS116

CE441 Embedded System Design **3 Cr Hr (3,0)** **5 ECTS**

Embedded system concepts, hardware architecture, design and debugging, embedded processor selection, software development methodologies, real-time Linux, synchronization mechanisms, interrupt latency, application programming interface, interrupt service routine, application design considerations.

Prerequisites: BSC001

CHEM103 General Chemistry I **3 Cr Hr (3,0)** **5 ECTS**

Stoichiometry of formulas and equations. Gases and the kinetic-molecular theory. Quantum theory and atomic structure. The components of matter. The major classes of chemical reactions (precipitation, acid-base, oxidation-reduction, and reversible reactions). Thermodynamics: energy flow and chemical change. Quantum theory and atomic structure. Electron configurations and chemical periodicity. Kinetics: rates and mechanisms of chemical reactions. Equilibrium: The extent of chemical reactions. Acid-base equilibria.

CS116 Computing Fundamentals **3 Cr Hr (3,0)** **5 ECTS**

Basic computer skills, programming concepts, algorithms, variables and data types; arithmetic, logical, relational, Boolean, and assignment operators; simple input and output statements, selection structures, loop structures, single and multidimensional arrays, character strings, functions, data structures, pointers, input/output file operations.

Corequisites: CS1160

CS1160 Computing Fundamentals lab **1 Cr Hr (0,3)** **2 ECTS**

Lab session every week to offer hands-on experience on the topics that are covered in CS116, which are: algorithms, variables and data types; arithmetic, logical, relational, Boolean, and assignment operators; simple input and output statements, selection structures, loop structures, single and multidimensional arrays, character strings, functions, data structures, pointers, input/output file operations.

Corequisites: CS1160

DES101 Arts' Appreciation **2 Cr Hr (3,0)** **3 ECTS**

An introductory course designed for non-art students to give them the basic knowledge of arts and simple approaches to the understanding of the history, development, elements, criticism, esthetics and materials of different art forms (visual, aural and performing arts). A comparative approach between the different arts is given to enhance the students' global understanding of arts and to give them the ability to look at art works and form their own opinions. The course is combined with examples of audio and visual arts.

Prerequisites: ENGL0099

ENGL0098 Elementary English **3 Cr Hr (3,0)** **3 ECTS**

Students will focus on English at an elementary level through the receptive skills of reading and listening and the productive skills of writing and speaking. English III is aimed at students who have achieved a grade of between 0 and 60 on the English Placement Test. This course is zero credit hours. This course enables students to contribute their own knowledge or experience in speaking activities, and use the language correctly. The exposure to a wide variety of listening material with a variety of accents, including some non-native speakers of English improves their level. English III integrates the focus on individual sounds of word and sentence stress where students are encouraged to copy the rhythm of English. Pronunciation is also integrated into Grammar and Vocabulary activities.

Prerequisites: Placement test

ENGL0099 Intermediate English **3 Cr Hr (3,0)** **3 ECTS**

Students will focus on English at an intermediate level through the receptive skills of reading and listening and the productive skills of writing and speaking. English IV is aimed at students who have successfully passed English III or achieved a grade of between 61–80 on the English Placement Test. This course is zero credit hours. Attendance: Students are required to attend regularly according to the regulations of GJU and should provide the instructor with official excuses in case they are absent for a long time. Participation and homework: Students are required to participate in the group discussion in class. Interaction is necessary as well as oral presentations will be given to measure how fluent students are and to improve their skill of speaking. Medium of communication: GJU email, face to face (on campus) and during office hours. Teaching method: Explaining, discussing and doing the exercises given to students.

Prerequisites: ENGL0098

ENGL1001 Upper-Intermediate English **3 Cr Hr (3,0)** **3 ECTS**

Education is the ability to listen to almost anything without losing your temper or your self-confidence." Robert Frost (1874 - 1963) English V is aimed at students who have achieved a passing grade in English IV or a grade between 81 and above on the English Placement Test. English V is equal to three credit hours. Students will focus on English at an upper intermediate level. Students will analyze and produce essays with an emphasis on argumentation and persuasion working both independently and cooperatively to gather, evaluate, and synthesize necessary information. Class activities include interactive lectures, small group and class discussions, informal debates, peer feedback, individual presentations, focused listening exercises and focused viewing exercises as well as assorted reading, writing, and grammar assignments. There will be some poetry analysis together with reading and understanding a short story and a drama using basic literary terms and concepts. Note: The process of argumentation enables us to clarify and develop our own responses to important issues, and a significant part of that process involves dialogue with both those who share our opinions and those who do not. In order to participate responsibly and effectively in meaningful dialogue, we must maintain an attitude characterized by openness, responsibility, rationality, and respect for all participants. Upon finishing this level, all students are eligible to receive an English language proficiency letter indicating their level according to the Common European Framework Reference for Languages (CEFR) varying between B1 and B2 according to the grade they get upon finishing this level.

Prerequisites: ENGL0099

ENGL1002 Advanced English **3 Cr Hr (3,0)** **3 ECTS**

Advanced English, is the last of the English levels at the German Jordanian University to arm graduates with the best command of the English language in its varied aspects: Reading, Writing, Speaking, Listening and Understanding. It is aimed at students who successfully pass English V and it is three credit hours. This level focuses on a higher level of enhancement of their language. Students can address any audience, through delivering a persuasive speech, making an informative presentation, or analyzing controversial News through News Analysis. The students' Thesis Statements are backed up with: mistake-free language, persuasive logic and verified statistics, numbers and facts to convince the audience with their points of view. Other tools are enhanced involving their language, including specific terminology, tone, intonation and body language to make them acquire the best outcome. Students can also address any topic in writing. With the language skills provided in this level, GJU graduates become more equipped with outstanding abilities and get better chances in the work market, in addition to their knowledge and education in the major fields. The assessment of the students applies Bloom's Taxonomy where the learning objectives are classified according to the different domains including: learning (remembering), understanding, applying, analyzing, evaluating, the creating. Upon finishing this level, all students are eligible to receive an English language proficiency letter indicating their level according to the Common European Framework Reference for Languages (CEFR) varying between B2, C1 or C2 according to the grade they get upon finishing this level

Prerequisites: ENGL1001

GERL101 German I **3 Cr Hr (9,0)** **6 ECTS**

Can understand and use familiar, everyday expressions and very simple sentences, which aim at the satisfaction of specific needs. Can introduce oneself, and others, and ask others questions to themselves - e.g., where they live, which people they know or what kind of things they have - and can give answers on questions of this kind. Can communicate on a basic level if those involved with him/ her in a conversation speak slowly and clearly and are willing to help.

GERL102 German II **3 Cr Hr (9,0)** **6 ECTS**

Can understand sentences and frequently used expressions if those are connected with things of immediate meaning (e.g., information to the person and to the family, buying, work, closer environment). Can communicate in simple, routine situations, with the purpose of a simple and direct exchange of information about familiar and common things. Can describe with simply means their own origin and training, direct environment and things that are in connection with direct needs.

Prerequisites: GERL101

GERL201 German III **3 Cr Hr (6,0)** **4 ECTS**

Can understand the main points if no dialect is used and if it concerns familiar things about work, school, spare time etc. Can master most situations, which one encounters on journeys in a German speaking area. Can express oneself simply and coherently about familiar topics and areas of personal interest. Can report experiences and events, describe dreams, hopes and goals and give short reasons or explanations about plans and opinions.

Prerequisites: GERL102

GERL202 German IV **3 Cr Hr (9,0)** **6 ECTS**

Can understand the main contents of complex texts, as well as concrete and abstract topics; even discussions between specialists in his/ her own special field. Can communicate spontaneously and fluidly a normal discussion with native speakers, without larger effort on both sides. Can express oneself clearly, in detail in a broad spectrum of topics, describe a point of view to a current question, and indicate the pro and cons of different possibilities.

Prerequisites: GERL201

GERL301 German V **3 Cr Hr (9,0)** **6 ECTS**

Can understand and seize implicit meanings of a broad spectrum of demanding, longer texts. Can express oneself

spontaneously and fluidly, recognizing words without having to search for words frequently. Can use the language effectively and flexibly in social and vocational life or in training and study. Can express oneself clearly, structured and detailed, to complex subjects and use appropriate different means for linkage of texts.

Prerequisites: GERL202

GERL302 German VI **3 Cr Hr (6,0)** **6 ECTS**

German VI is a strongly practice-oriented course in preparation for your German Year. The course includes the modules "Intercultural Communication", "Job Application Training" and the technical languages. In part, it includes a special support program for students who did not achieve their language goal of a full B1 certificate in German V.

Prerequisites: GERL301

IE0141 Engineering Workshop **1 Cr Hr (0,3)** **4 ECTS**

General safety, materials and their classifications, measuring devices and their accuracy, theoretical background and practical exercises including, carpentry, welding, mechanical fasteners, drills, lathes, milling machines, and sheet-metal working.

IE0281 Technical Writing and Engineering Ethics **2 Cr Hr (2,0)** **3 ECTS**

Technical communication, process of writing, presentations, relationship between ethical standards and technology, analysis of ethical dilemmas.

Prerequisites: ENGL1001

IE0361 Engineering Economics **3 Cr Hr (3,0)** **5 ECTS**

Principles of engineering economics, cost concepts, time value of money, interest formula, depreciation models, rate of return, cash flow, project evaluation methods, replacement analysis, break even analysis, economic studies for decision making.

Prerequisites: MATH205

IE0417 Business and Labor Law **3 Cr Hr (3,0)** **5 ECTS**

A program elective course in business and labor Law.

Prerequisites: BSC001

IE0515 Product Development and Entrepreneurship **3 Cr Hr (3,0)** **5 ECTS**

Integration of the marketing, design, and manufacturing functions of organizations in creating entrepreneurial and new innovative products. Tools and methods for product design and development. Multiple functions in creating a new product (marketing, finance, industrial design, engineering, production), Definition of entrepreneurs and entrepreneurship, Entrepreneurship in economic theory, Historical development of entrepreneurship, Type of entrepreneurship and features and types of businesses and entrepreneurs, Sources of business ideas, Innovation and entrepreneurship, Entrepreneurship and small business.

Prerequisites: BSC001

IE0516 Facilities and Asset Management **3 Cr Hr (3,0)** **5 ECTS**

Students learn the concepts and methodology of facilities planning as well as layout planning, optimization algorithms applied to facilities layout, selection of material handling systems, and operations of warehouse. Students acquire knowledge and skills in the areas of strategic facilities planning and manufacturing facilities design. Students carry independent project work and research in the field.

Prerequisites: BSC001

IE0533 Supply Chain Engineering **3 Cr Hr (3,0)** **5 ECTS**

The module covers topics related to supply chain design, planning, and integration. This includes sourcing decisions, logistic systems, capacity analyses, aggregate planning, and distribution networks. The module also discusses latest development in supply chain management including sustainability and technology applications. The team project portion of the module allows the students to model and evaluate a real-world supply chain. This includes developing a SIPOC structure, setting KPIs, and optimizing the supply chain network.

Prerequisites: BSC001

IE0562 Industrial Cost Analysis **3 Cr Hr (3,0)** **5 ECTS**

Students gain knowledge regarding managerial accounting and cost concepts, classifications and calculations. Module also introduces ABC and other costing methods such as cost for pricing, cost evaluation and improvement, costs for decision making, budgeting, and variance analysis. Students are introduced to financial balance sheet calculations, depreciation, assets and liabilities, and taxes.

Prerequisites: BSC001

MATH101 Calculus I **3 Cr Hr (3,0)** **5 ECTS**

Review of functions, functions, Inverse functions, Inverse trigonometric functions, the concept of limits, Computation of limits, Continuity, Asymptotes, The Derivative, Computation of derivatives, the product and quotient rules, The Chain Rule, Derivatives of Trigonometric, Inverse Trigonometric, Exponential, Logarithmic, and Hyperbolic Functions. Applications of Differentiation: Increasing and Decreasing Functions, Extrema of Functions, Graphs of Functions, Indeterminate Forms and L'Hopital Rule. Antiderivatives, Definite integrals, Fundamental Theorem of Calculus, Integration by Substitutions, Integration by Parts, Applications of integration: Area between curves, Arc length, Volume and Surface Area of Solids of Revolution.

Prerequisites: MATH0099

MATH102 Calculus II **3 Cr Hr (3,0)** **5 ECTS**

Review of Integration, Integration by Trigonometric Substitutions, Integration using Partial Fractions, Improper Integrals. Vectors in 2 and 3 Spaces, The Inner and Cross Products of vectors. Polar Coordinates, Graphs and Arc length of Polar curves. Functions of Several Variables; Domain, Limits, and Continuity. Partial Derivatives, The Chain Rule, The Gradient and Directional Derivatives, Extrema of Functions of Several Variables and Lagrange multipliers. Double Integrals, Area of Plane Region and Volumes of Solids using Double integrals, Triple Integrals, Cylindrical and Spherical Coordinates, Triple Integrals using Cylindrical and Spherical Coordinates.

Prerequisites: MATH102

MATH203 Applied Mathematics for Engineers **3 Cr Hr (3,0)** **5 ECTS**

Vector analysis in Cartesian coordinates. General Curvilinear Coordinates, Vector calculus in general curvilinear coordinates with emphasis on Spherical and Cylindrical coordinates, transformations between different coordinate systems, vector differentiation. Matrices and linear equations; Matrices and Linear Operators; Determinants, Eigenvalues and eigenvectors. Complex Numbers and Complex Variables; Representation of complex numbers, Powers and roots of complex numbers, Functions of a complex variable. Review of Infinite Series; Infinite series of constant terms, Convergence tests, Power series and radius of convergence, Taylor, and Maclaurin series and Fourier series.

Prerequisites: MATH102 ,ARB0099, ENGL0099

MATH205 Differential Equations **3 Cr Hr (3,0)** **5 ECTS**

Ordinary differential equations; Sturm-Liouville theory, properties of Special Functions, Solution methods including Laplace transform, and Fourier transform. Eigenvalue problems and expansions in orthogonal functions. Partial differential equation: classification, separation of variables, solution by series and transform methods. Models in Applied Mathematics; Applications to illustrate typical problems and methods of applied mathematics in solid and fluid mechanics, fields of physics, deformation and vibration, wave phenomena, diffusion phenomena,

heat conduction, chemical and nuclear reactors, and biological processes.

Prerequisites: MATH102 ARB0099, ENGL0099

ME0111 Computer Aided Engineering Drawing **2 Cr Hr (0,6)** **4 ECTS**

The use of computer aided software in drawing such as AutoCAD. Geometric constructions. Orthographic and Isometric projections; Sketching, sectioning, dimensioning and layering. Model Layout (wire-frame, surface, and solid modeling), plotting to scale, blocks and attributes, Introduction to descriptive geometry, perspective drawing. Engineering applications.

Prerequisites: CS116

MECH2201 Applied Thermodynamics **3 Cr Hr (3,0)** **5 ECTS**

Students get acquainted with the fundamentals of Thermodynamic concepts and definitions, states, properties, systems, control volume; processes, cycles, and units; pure substances, equation of states, table of properties; work and heat; the first law, internal energy and enthalpy; conservation of mass; steady-state flow and unsteady flow processes; the second law, heat engines and refrigerators, reversible processes, entropy, Clausius inequality, principle of the increase of entropy, efficiencies. Carnot cycle, Otto cycle, Diesel cycle, Rankine cycle, vapor compression refrigeration cycles.

Prerequisites: ARB0099, ENGL0099, MATH102

MECH2202 Fluid Flow and Heat Transfer **3 Cr Hr (3,0)** **5 ECTS**

Fundamental concepts in fluid mechanics, Properties of fluids, Pressure and fluid statics, Mass, Bernoulli, and energy equations, Momentum analysis of flow systems, Internal incompressible viscous flow, mechanisms of heat transfer: conduction, convection and radiation, Heat conduction equations, External and internal forced convection; Natural convection.

Prerequisites: ARB0099, ENGL0099, MECH2201

MECH4214 Thermal Management of Electronic Systems **3 Cr Hr (3,0)** **5 ECTS**

Introduction to principles of thermal management for controlling heat dissipation in electronics systems. Understanding of how basic heat transfer principles can be applied to the thermal design of electronic packages. Passive and active thermal management techniques for electronic systems & components are considered with regard to fundamental heat transfer modes. Design studies for single- and multi-chip modules, printed circuit board, and high-heat-flux cooling.

Prerequisites: BSC001

MECH4407 Failure Analysis **3 Cr Hr (3,0)** **5 ECTS**

Theory of Failure Analysis, Industry Quality Systems Overview, Failure Mode Effect Analysis (FMEA) overview, process flow, control, prevention, detection, and types, and Application of failure analysis in industries.

Prerequisites: BSC001

MECH4410 Six Sigma **3 Cr Hr (3,0)** **5 ECTS**

Introduction to the Define, Measure, Analyze, Improve and Control (DMAIC) method that includes project definition, measurement of the most critical process variables, analysis of the associated data, improvement based on statistical test planning and control of the future process. Six Sigma concepts and methodologies in practice.

Prerequisites: BSC001

MECH5501 Heating Ventilation and Air Conditioning **3 Cr Hr (3,0)** **5 ECTS**

Introduction to HVAC economics, HVAC systems, Psychometrics, Indoor air quality/comfort issues, Heat transmission in building structures, Space heating load, Solar radiation, Space cooling load, Fans and duct system design, Pumps and piping design.

Prerequisites: BSC001

MECH5606 Hybrid and Electric Vehicles **3 Cr Hr (3,0)** **5 ECTS**

Hybrid and electric vehicles are currently the dominant technologies in the new generation of automobiles. This course examines the sub-systems of hybrid and electrified vehicles—including the engine—as well as the integration of these sub-systems into the vehicle. The course covers the modeling and analysis of vehicles with electrified propulsion systems, including electric vehicles, hybrids, plug-in, and fuel cell vehicles. The course will introduce students to the concepts and terminology, state-of-the-art developments, energy conversion and storage options, and system integration.

Prerequisites: BSC001

MGT418 Quality Management **3 Cr Hr (3,0)** **5 ECTS**

Total Quality Management (TQM) helps the students to learn to view quality from a variety of functional perspectives, gain a better understanding of the problems associated with improving quality, also quality tools utilized in service and international/environments. This module focuses on the essence, principles, and practices of total quality management (TQM). Some of the ideas and topics that are covered are: process improvement; process orientation; service quality; human resources; customer satisfaction programs; quality function deployment; process control and capability; role of inspection; economics of quality; productivity measurement; learning and organizational performance measures; and teachings of Deming, Juran, and Crosby.

Prerequisites: BSC001

MILS100 Military Science **3 Cr Hr (3,0)** **2 ECTS**

History of the Jordanian Arab Army. United Nations Peace Keeping Forces. Preparation of the nation for defense and liberation. History of the Hashemite Kingdom of Jordan and its development

NE101 National Education **3 Cr Hr (3,0)** **2 ECTS**

In a context of striving towards democracy like the one Jordan enjoys today, the meaning and practice of active and responsible citizenship becomes more crucial. It is often argued that democracy requires “democrats” to flourish, and become well established. Democrats are those women and men who recognize pluralism, inclusion, positive engagement, and participation as the main values that govern their interaction with the state as citizens and with each other as diverse people of different interests. In this course you will be able to understand your rights and responsibilities as Jordanian citizen expand your knowledge about the frameworks, and processes that regulates citizen-state relationships as well as the basic necessary skills for you to practice your citizenship rights in a civic manner.

NEE101 National Education in English **3 Cr Hr (3,0)** **2 ECTS**

In a context of striving towards democracy like the one Jordan enjoys today, the meaning and practice of active and responsible citizenship becomes more crucial. It is often argued that democracy requires “democrats” to flourish, and become well established. Democrats are those women and men who recognize pluralism, inclusion, positive engagement, and participation as the main values that govern their interaction with the state as citizens and with each other as diverse people of different interests. In this course you will be able to understand your rights and responsibilities as Jordanian citizen expand your knowledge about the frameworks, and processes that regulates citizen-state relationships as well as the basic necessary skills for you to practice your citizenship rights in a civic manner.

PHYS103 Physics I **3 Cr Hr (3,0)** **5 ECTS**

Physics and measurement, Motion in one dimension, Vectors, Motion in two dimensions, Force and motion, Kinetic energy and work, Potential energy and conservation of energy, Linear momentum and collisions, Rotation, Rolling and angular momentum.

PHYS104 Physics II **3 Cr Hr (3,0)** **5 ECTS**

Electric Fields, Gauss's Law, Electric Potential, Capacitance and Dielectrics, Current and Resistance, Direct Current Circuits, Magnetic Fields, Sources of the Magnetic Field, and Faraday's Law.

Prerequisites: PHYS103

PHYS106 General Physics Lab **1 Cr Hr (0,3)** **2 ECTS**

Developing a good understanding of a few important concepts in Mechanical physics, Learning to apply these concepts to familiar and unfamiliar situations and Gaining the ability to reason qualitatively and quantitatively about Mechanics.

Prerequisites: PHYS103
Corequisites: PHYS104