Sana'a University
Faculty of Engineering

Biomedical Engineering

Program Specifications

October - 2020

Faculty of Engineering, Sana'a University

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Biomedical Engineering Program Specifications

October - 2020

Preparation Committee:

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Biomedical Engineering Program Specifications

	Program Identification and General Information:	
1	**Scientific name of the program:**	Biomedical Engineering Program
2	**Total credit hours required to award the degree**	180 Credit hours
3	**Number of years needed for completion of the program:**	5 Years [10 Academic semesters]
4	**The body responsible for granting the degree:**	Sana'a University
5	**The body responsible for the program:**	Department of Biomedical Engineering, Faculty of Engineering, Sana'a University
6	**Award granted on completion of the program:**	Bachelor of Science in Biomedical Engineering
7	**Study system:**	Regular attendance to classes and labs
8	**Study Language of the Program:**	English
9	**Entry requirements:**	Secondary School Certificate
10	**Departments participating in the program:**	Electrical Engineering Department, Mechanical Engineering Department, Mechatronics Engineering Department.
11	**Starting year of the program:**	2020/2021
12	**Study methods in the program:**	Full time
13	**Location of Delivery:**	Sana'a University, Faculty of Engineering
14	**The program resources:**	Sana'a University, Faculty of Engineering
15	**Minimum grade requirements:**	As per Regulations of the Ministry of Higher Education and Scientific Research
16	**Other admission requirements:**	According to the University Rules and Regulations
17	Date of current development and approval program	May - October 2020

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18	**Prepared by :**	A committee formed by the decision of the university president No.(255) for the year 2020, dated 10/5/2020.
19	**Program coordinator:**	1- Dr. Hatem Al-Dois 2- Dr. Mohammed Al-Olofy

Introduction:

To date, there is no scientific department or academic program in the field of Biomedical Engineering in all of the Engineering Faculties of the Yemeni government universities. This scientific deficiency must be addressed by establishing a Biomedical Engineering department and program at Faculty of Engineering, Sana'a University to educate and graduate qualified engineers to serve and meet the needs of the local and regional labor market, national development needs, and contribute effectively in scientific research in the broad field of Biomedical Engineering.

Biomedical Engineering is the application of engineering principles and methods to solve medical and biological problems. It also integrates electrical, mechanical, chemical and life science principles in the development of new healthcare technology and systems. It aims to provide students with both an understanding of biology and medical theory and with highly specialized technical training in such fields as electrical, physics, material and mechanical engineering. By these concepts and principles the gap is bridged between medicine and engineering fields. The program is five-years with courses include a wide range of subjects, such as chemistry, physiology, materials, mechanics, electronics, imaging and biomedical instruments. Design and research-based projects are integral parts of the curriculum. They help to develop in students the spirit of innovation, multidisciplinary and critical thinking skills.

Promising Jobs/Employments for Graduates:

Graduates of the Biomedical Engineering program find employment in the medical device and pharmaceutical industries, as well as in hospitals, research organizations, and government agencies. Alternatively, Biomedical Engineering graduates pursue advanced degrees in fields such as biomedical engineering, engineering management, medicine, dentistry, prosthetics and orthotics, and public health. In general, biomedical engineering graduates can look at opportunities and jobs in the following sectors and industries:

1. Governmental and private hospitals
2. Governmental and private laboratories
3. Various clinics and medical centers
4. Physiotherapy centers and prostheses
5. Ministry of Public Health and Population
6. Specialized scientific and research bodies and centers

7. Companies, institutions and agencies specialized in medical devices and equipment
8. Universities, colleges, and public and private Institutes

Vision, Mission, Goals & Values of the Department

الرؤية:

الريادة والتميز وطنيا ودوليا في تعليم الهندسة الطبية الحيوية والبحث العلمي .

Vision:

Pioneering and excellence nationally and internationally in Biomedical Engineering education, and scientific research.

الرسالة:

إعداد خريجين مؤهلين تأهيلاً عالياً في الهندسة الطبية الحيوية من خلال تقديم تعليم معتمد وبحث علمي متميز لتلبية احتياجات المجتمع وسوق العمل والتنمية المستدامة.

Mission:

To prepare highly qualified graduates in biomedical engineering by providing accredited education and distinguished scientific research to meet the needs of society, the labor market and sustainable development.

Objectives of the Department:

The Biomedical Engineering Department goals are:

1. To provide solid and high-quality education in the field of biomedical engineering.
2. To deliver a program which equips graduates with a high level of understanding of Biomedical Engineering concepts complemented by professional, practical, and transferable skills that enable graduates to solve a wide range of Biomedical Engineering problems.
3. To prepare engineers to be able to compete and work productively, professionally and efficiently in the biomedical engineering industries, academia and health care institutions.
4. To develop a spirit of innovation, creativity, adaptability, life-long learning, capability, and critical thinking necessary to create ideal solutions to biomedical engineering problems.
5. To encourage a culture of scientific research by providing the necessary research facilities.
6. To build up skills of co-operation, multidisciplinary team(s) work, effective leadership, sense of responsibility, professional, ethical commitment and ability to communicate effectively both orally or in written reports to a variety of audiences.

القيم:

الريادة، العمل الجماعي، الشراكة، الشفافية، المهنية، الإبداع.

Department Values:

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Entrepreneurship, Teamwork, Partnership, Transparency, Professionalism, Creativity.

Program Mission and Goals:

رسالة البرنامج:

إعداد خريجين قادرين على اكتساب وتطبيق المعرفة لتصميم وتطوير أنظمة الهندسة الطبية الحيوية ومواكبة التطورات الحالية في المجال وإجراء البحوث والدراسات العلمية التي تسهم في رفع مكانة الجامعة عالمياً. تلبية احتياج المجتمع والتنمية المستدامة وكذلك لتحديد وحل مشاكل الهندسة الطبية الحيوية بطريقة مسؤولة .

Program Mission:

Preparing graduates who are able to acquire and apply knowledge to design and develop biomedical engineering systems and keeping updated with current developments in the field of BME. Conducting scientific research and studies that contribute to raising the university's status globally. Meeting the needs of community and sustainable development, as well as, to identify and solve biomedical engineering problems in an ethically responsible manner.

Program Objectives:

The Biomedical Engineering Program goals are:

1. To provide solid and high-quality education in the field of biomedical engineering.
2. To graduate leaders who can communicate well at all levels within an organization.
3. To facilitate a suitable environment for students to apply theory with practice-oriented laboratory, industrial, or clinical experiences.
4. To provide the necessary engineering consulting for the labor market.
5. To encourage a culture of scientific research by providing the necessary research facilities.
6. To prepare engineers who can work well either independently or in a team.

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Graduate Attributes:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

1. Understand the fundamentals of biomedical engineering through applying the appropriate mathematical methods; principles of physics; basic of life-science; engineering principles; and modern tools and techniques in solving Biomedical Engineering relevant problems.

2. Identify, formulate and analyze biomedical engineering problems in a creative and innovative way to develop alternative solutions and to reach substantiated conclusions.

3. Design digital systems; devices; and/or processes that meets specified needs of healthcare fields taking into account health risks; safety rules; technical standards and economic aspects as well as environment and culture impacts.

4. Use and extend appropriate techniques, resources, and modern engineering tools necessary for Biomedical Engineering practices and for disseminating the results of their work with an understanding of the associated limitations

5. Design, conduct and document appropriate experiments, analysis and interpretation of data and synthesis of information from living systems, addressing the problems associated with the interaction between living and non-living materials using modern techniques in order to reach valid conclusions.

6. Consider professional ethics, accountability, and equity responsibilities in Biomedical Engineering fields.

7. Work productively within a multidisciplinary team(s), communicate effectively, and undertake lifelong self-learning.

8. Recognize intellectual property and patents, marketing fundamentals, the regulatory environment and quality control issues for products and processes used in medicine and health care.

9. Possess modern technical awareness to keep up with multiple applications in the field of biomedical engineering.

10. Use accumulated knowledge to provide advice on the selection, use of, supervising performance testing of, and maintenance of medical equipment for the government and private entities such as clinic and hospital environments.

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Program Intended Learning Outcomes (PILOs):

A. Knowledge and Understanding:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

A.1 Describe and explain the underlying mathematical methods and theories; life scientific-principles; and engineering core concepts related to the Biomedical Engineering context.

A.2 Clarify the design principles and techniques and the engineering materials characteristics and how these are relevant to the developments and technologies in a biomedical systems context.

A.3 Recognize and explain the need for a high level of management, professional and ethical behavior, responsibility, quality assurance systems, codes of practice, standards, health and safety requirements, and environmental impacts in biomedical systems.

A.4 Understand and give examples of design methods, knowledge tools, analytical skills, measurement techniques and methodologies for innovative and creative engineering solutions applied to healthcare problems and quality of life issues.

B. Cognitive/ Intellectual Skills:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

B.1 Apply engineering principles; basic of life-science; mathematical theories; and modern tools professionally in modelling, analyzing, designing, and constructing physical digital systems; devices and/or processes relevant to Biomedical Engineering fields.

B.2 Identify, formulate and solve the complex problems related to the Biomedical Engineering fields in a creative and innovative manner by using a systematic and analytical thinking methods.

B.3 Design the biomedical systems or processes within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

B.4 Consider the principles of management and its various functions to work professionally in Biomedical Engineering fields.

B.5 Distinguish the main characteristics of biomedical systems, apply diagnostic skills and technical knowledge and perform failure analysis to these systems.

C. Practical and Professional Skills:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

C.1 Apply integrally knowledge of mathematics, life science, IT, design, business context and engineering practice to solve problems and to design systems/processes relevant to Biomedical Engineering.

C.2 Use a wide range of analytical tools, techniques, IT, modern engineering tools, software packages and develop required computer programs to solve, modeling and analyzing Biomedical

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Engineering problems.

C.3 Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design and conduct experiments, collect, analyse and interpret data and present results in the biomedical systems practice.

C.4 Use rules and regulations of industrial safety as well as safe and diagnose systems at work, evaluate performance and observe the appropriate steps to manage risks concerning biomedical systems.

C.5 Demonstrate basic organizational and project management skills, apply quality assurance procedures, practice neatness and aesthetics and follow codes and standards to improve biomedical products design or services

D. General and Transferable Skills:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

D.1 Lead and motivate individuals, show capability to work in stressful environments and within constraints, collaborate effectively within multidisciplinary team.

D.2 Acquire entrepreneurial skills and effectively manage tasks, time, processes and resources.

D.3 Recognize the needs for, and engage in life-long self-learning.

D.4 Refer to relevant literatures, search for information, use databases, as well as, evaluate information and evidence from various sources in biomedical engineering.

D.5 Demonstrate efficient IT capabilities and communicate effectively both orally and in writing technical reports.

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Program Structure:

No	Requirements		No. of Courses	Credit Hours	Rational Weight %
1	**University Requirements**	Compulsory	**8**	**17**	**9.4%**
		Elective	**0**	**0**	
2	**Faculty Requirements**	Compulsory	**5**	**14**	**7.8%**
		Elective	**0**	**0**	
3	**Basic Requirements**	Compulsory	**9**	**25**	**13.9%**
		Elective	**0**	**0**	
4	**Department Requirements**	Compulsory	**--**	**--**	**0%**
		Elective	**--**	**--**	
5	**General Courses (Including Graduation Project & Field Training)**	Compulsory	**5**	**10**	**5.6%**
		Elective	**0**	**0**	
6	**Program Requirements**	Compulsory	**34**	**105**	**58.3%**
	Electrical Engineering (Family 1)		*4*	*12*	
	Electronics (Family 2)		*8*	*25*	
	Computer Programming (Family 3)		*3*	*9*	
	Mechanical Engineering (Family 4)		*4*	*12*	
	Control (Family 5)		*4*	*14*	
	Biomedical Core (Family 6)		*9*	*27*	
	Biomedical Electives & Extras (Family 7)		*2*	*6*	
	Biomedical Electives & Extras (Family 7)	Elective	**3**	**9**	**5.0%**
	Total:		**64**	**180**	**100%**

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University Requirements (17 + 0) C.H.

Compulsory Courses (17 C.H.)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	1/1	UR001	Arabic Language 1	لغة عربية ١	2	0	0	2	
2	1/1	UR002	English Language 1	لغة انجليزية ١	2	0	0	2	
3	1/1	UR003	Computer Skills	مهارات حاسوب	2	0	2	3	
4	1/2	UR004	Arabic Language 2	لغة عربية ٢	2	0	0	2	
5	1/2	UR005	English Language 2	لغة انجليزية ٢	2	0	0	2	
6	1/2	UR006	Islamic Culture	ثقافة إسلامية	2	0	0	2	
7	1/1	UR007	Arabic-Israeli Conflict	الصراع العربي الإسرائيلي	2	0	0	2	
8	1/2	UR008	National Culture	الثقافة الوطنية	2	0	0	2	
					16	0	2	17	

Elective Courses: None (0 C.H.)

Faculty Requirements (14 + 0) C.H.

Compulsory Courses (10 hrs)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	1/1	FR001	Mathematics 1	رياضيات ١	2	2	0	3	
2	1/1	FR002	Engineering Physics	فيزياء هندسية	2	2	2	4	
3	1/2	FR003	Mathematics 2	رياضيات ٢	2	2	0	3	
4	2/2	FR105	Entrepreneurship & Communication Skills	ريادة أعمال ومهارات تواصل	1	2	0	2	
5	4/1	FR304	Engineering Project Management	إدارة مشاريع هندسية	1	2	0	2	
					8	10	2	14	

Elective Courses: None (0 C.H.)

Basic Requirements (25 + 0) C.H.

Compulsory Courses (25 C.H.)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	1/1	BR001	Engineering Mechanics – Statics	ميكانيكا هندسية – استاتيكا	2	2	0	3	
2	1/1	BR002	Engineering Workshop	ورش هندسية	2	0	2	3	
3	1/2	BR003	Engineering Drawing	رسم هندسي	1	0	4	3	
4	1/2	BR005	Engineering Chemistry	كيمياء هندسية	2	2	0	3	

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No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
5	1/2	BR006	Engineering Mechanics – Dynamics	ميكانيكا هندسية – ديناميكا	2	2	0	3	
6	2/1	BR111	Scientific English	لغة انجليزية علمية	2	0	0	2	
7	2/1	BR121	Mathematics 3	رياضيات ٣	2	2	0	3	
8	2/2	BR122	Engineering Mathematics	رياضيات هندسية	2	2	0	3	
9	3/1	BR231	Probability and Statistics for Engineers	الاحتمالات والاحصاء للمهندسين	2	0	0	2	
					17	**10**	**6**	**25**	

Elective Courses: None (0 C.H.)

General Courses (10 + 0) C.H.

Compulsory Courses (10 C.H.)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	2/1	BE101	General Biology	علم الاحياء العامة	2	0	2	3	
2	3/1	BE202	Biochemistry	كيمياء حيوية	2	0	2	3	
3	5/1	BE403	Graduate Project 1	مشروع تخرج ١	2	0	0	2	
4	5/2	BE404	Graduate Project 2	مشروع تخرج ٢	2	0	0	2	
5	5/2	BE405	Field Attachments and Training	التدريب الميداني	0	0	0	0	
					8	**0**	**4**	**10**	

Elective Courses: None (0 C.H.)

Program Requirements (109 + 9) C.H.

Compulsory Courses (109 C.H.)

Electrical Engineering (Family 1)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	2/1	BE111	Electrical Circuits 1	دوائر كهربائية ١	2	0	2	3	
2	2/2	BE112	Electrical Circuits 2	دوائر كهربائية ٢	2	0	2	3	
3	3/1	BE213	Electromagnetic Field	مجالات كهرومغناطيسية	2	2	0	3	
4	3/2	BE214	Electrical Machines	آلات كهربائية	2	0	2	3	
					8	**2**	**6**	**12**	

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Electronics (Family ٢)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	2/1	BE121	Logic System Design	تصميم نظم منطقية	2	2	2	4	
2	2/2	BE122	Electronics 1	الكترونيات ١	2	0	2	3	
3	3/1	BE223	Electronics 2	الكترونيات ٢	2	0	2	3	
4	3/1	BE224	Biomedical Sensors and Measurements	حساسات طبية وقياسات	2	0	2	3	
5	3/2	BE225	Biomedical Signals Processing	معالجة اشارات طبية	2	0	2	3	
6	4/1	BE326	Power Electronics and Drivers	الكترونيات قوي	2	0	2	3	
7	3/2	BE227	Bioelectronics	الكترونيات حيوية	2	0	2	3	
8	4/2	BE328	Micro Electro-Mechanical Systems	نظم الكترو-ميكانيكية دقيقة	2	0	2	3	
					16	**2**	**16**	**25**	

Computer Programming (Family 3)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	2/1	BE151	Computer Programming 1	برمجة حاسوب ١	2	0	2	3	
2	2/2	BE152	Computer Programming 2	برمجة حاسوب ٢	2	0	2	3	
3	5/1	BE453	Medical Image Processing	معالجة الصور الطبية	2	0	2	3	
					6	**0**	**6**	**9**	

Mechanical Engineering (Family 4)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	2/2	BE141	Bio Fluid Mechanics	ميكانيكا موائع حيوية	2	2	0	3	
2	3/1	BE242	Thermodynamics	ديناميكا حرارية	2	2	0	3	
3	3/2	BE243	Biomechanics	ميكانيكا حيوية	2	2	0	3	
4	3/1	BE244	Biomedical Materials	مواد حيوية	2	2	0	3	
					8	**8**	**0**	**12**	

Control (Family 5)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	3/2	BE251	Analog Control Systems	نظم تحكم تماثلي	2	2	2	4	
2	4/1	BE352	Digital Control Systems	نظم تحكم رقمي	2	2	2	4	
3	4/1	BE353	Microprocessor and Microcontrollers	معالجات ومتحكمات دقيقة	2	0	2	3	
4	4/2	BE354	Embedded Systems and Interfacing	الأنظمة المدمجة والواجهات	2	0	2	3	
					8	**4**	**8**	**14**	

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Biomedical Core (Family 6)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	2/1	BE161	Physiology & anatomy 1	فسيولوجي وتشريح ١	2	0	2	3	
2	2/2	BE162	Physiology & anatomy 2	فسيولوجي وتشريح ٢	2	0	2	3	
3	3/2	BE263	Biomedical Equipment 1	أجهزة طبية ١	2	0	2	3	
4	4/1	BE364	Biomedical Equipment 2	أجهزة طبية ٢	2	0	2	3	
5	4/2	BE365	Biomedical Equipment 3	أجهزة طبية ٣	2	0	2	3	
6	4/1	BE366	Clinical Engineering	هندسة اكلينيكية	2	2	0	3	
7	4/2	BE367	Biomedical Systems Design	تصميم الانظمة الطبية الحيوية	2	0	2	3	
8	5/1	BE468	Medical Imaging System 1	نظم التصوير الطبي ١	2	0	2	3	
9	5/2	BE469	Medical Imaging System 2	نظم التصوير الطبي ٢	2	0	2	3	
					18	2	16	27	

Elective Courses (9 C.H.)

Biomedical Electives & Extras (Family 7)

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.	Prerequisites, Co-requisites
1	5/1	BE471	Biomedical Equipment Maintenance	صيانة الأجهزة الطبية	2	0	2	3	
2	4/2	BE372	Safety in Biomedical Engineering	الأمان والسلامة في الهندسة الطبية	2	2	0	3	
3	4/2	BE373	Elective 1 - Hospital Systems: Design & Management	اختياري ١ – تصميم وإدارة مستشفيات	2	2	0	3	
4	4/2	BE374	Elective 1 - Management Systems and health care delivery	اختياري ١ – نظم إدارة ورعاية صحية	2	2	0	3	
5	5/1	BE475	Elective 2 - Artificial Intelligence	اختياري ٢ – ذكاء اصطناعي	2	0	2	3	
6	5/1	BE476	Elective 2 - Robotics Principles and Applications in BME	اختياري ٢ – مبادئ الروبوتات وتطبيقاتها	2	2	0	3	
7	5/2	BE477	Elective 3 - Cell and Tissue Engineering	اختياري ٣ – هندسة الخلايا والأنسجة	2	2	0	3	
8	5/2	BE478	Elective 3 - Nuclear medicine techniques	اختياري ٣ – تكنولوجيا الطب النووي	2	2	0	3	
								15	

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Study Plan 2020

Level 1 – Semester 1:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	UR001	Arabic Language 1	لغة عربية ١	2	0	0	2
2	UR002	English Language 1	لغة انجليزية ١	2	0	0	2
3	UR003	Computer Skills	مهارات حاسوب	2	0	2	3
4	UR007	Arabic-Israeli Conflict	الصراع العربي الاسرائيلي	2	0	0	2
5	FR001	Mathematics 1	رياضيات ١	2	2	0	3
6	FR002	Engineering Physics	فيزياء هندسية	2	2	2	4
7	BR001	Engineering Mechanics – Statics	ميكانيكا هندسية ـ استاتيكا	2	2	0	3
8	BR002	Engineering Workshop	ورش هندسية	2	0	2	3
				16	**6**	**6**	**22**

Level 1 – Semester 2:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	UR004	Arabic Language 2	لغة عربية ٢	2	0	0	2
2	UR005	English Language 2	لغة انجليزية ٢	2	0	0	2
3	UR006	Islamic Culture	ثقافة اسلامية	2	0	0	2
4	UR008	National Culture	الثقافة الوطنية	2	0	0	2
5	FR003	Mathematics 2	رياضيات ٢	2	2	0	3
6	BR003	Engineering Drawing	رسم هندسي	1	0	4	3
7	BR005	Engineering Chemistry	كيمياء هندسية	2	2	0	3
8	BR006	Engineering Mechanics – Dynamics	ميكانيكا هندسية – ديناميكا	2	2	0	3
				15	**6**	**4**	**20**

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Level 2 – Semester 1:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	BR111	Scientific English	لغة انجليزية علمية	2	0	0	2
2	BR121	Mathematics 3	رياضيات ٣	2	2	0	3
3	BE101	General Biology	علم الأحياء العامة	2	0	2	3
4	BE111	Electrical Circuits 1	دوائر كهربائية ١	2	0	2	3
5	BE121	Logic System Design	تصميم نظم منطقية	2	2	2	4
6	BE151	Computer Programming 1	برمجة حاسوب ١	2	0	2	3
7	BE161	Physiology & anatomy 1	فسيولوجي وتشريح ١	2	0	2	3
				14	4	10	21

Level 2 – Semester 2:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	FR105	Entrepreneurship & Communication Skills	ريادة أعمال ومهارات تواصل	1	2	0	2
2	BR122	Engineering Mathematics	رياضيات هندسية	2	2	0	3
3	BE112	Electrical Circuits 2	دوائر كهربائية ٢	2	0	2	3
4	BE122	Electronics 1	الكترونيات ١	2	0	2	3
5	BE141	Bio Fluid Mechanics	ميكانيكا موائع حيوية	2	2	0	3
6	BE152	Computer Programming 2	برمجة حاسوب ٢	2	0	2	3
7	BE162	Physiology & anatomy 2	فسيولوجي وتشريح ٢	2	0	2	3
				13	6	8	20

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Level 3 – Semester 1:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	BR231	Probability and Statistics for Engineers	الاحتمالات والإحصاء للمهندسين	2	0	0	2
2	BE202	Biochemistry	كيمياء حيوية	2	0	2	3
3	BE213	Electromagnetic Field	مجالات كهرومغناطيسية	2	2	0	3
4	BE223	Electronics 2	الكترونيات ٢	2	0	2	3
5	BE224	Biomedical Sensors and Measurements	حساسات طبية وقياسات	2	0	2	3
6	BE242	Thermodynamics	ديناميكا حرارية	2	2	0	3
7	BE244	Biomedical Materials	مواد حيوية	2	2	0	3
				14	6	6	20

Level 3 – Semester 2:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	BE214	Electrical Machines	آلات كهربائية	2	0	2	3
2	BE225	Biomedical Signals Processing	معالجة اشارات طبية	2	0	2	3
3	BE227	Bioelectronics	الكترونيات حيوية	2	0	2	3
4	BE243	Biomechanics	ميكانيكا حيوية	2	2	0	3
5	BE251	Analog Control Systems	نظم تحكم تماثلي	2	2	2	4
6	BE263	Biomedical Equipment 1	أجهزة طبية ١	2	0	2	3
				12	4	10	19

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Level 4 – Semester 1:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	FR304	Engineering Project Management	إدارة مشاريع هندسية	1	2	0	2
2	BE326	Power Electronics and Drivers	الكترونيات قوي	2	0	2	3
3	BE352	Digital Control Systems	نظم تحكم رقمي	2	2	2	4
4	BE353	Microprocessor and Microcontrollers	معالجات ومتحكمات دقيقة	2	0	2	3
5	BE364	Biomedical Equipment 2	أجهزة طبية ٢	2	0	2	3
6	BE366	Clinical Engineering	هندسة اكلينيكية	2	2	0	3
				11	6	8	18

Level 4 – Semester 2:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	BE328	Micro Electro-Mechanical Systems	نظم الكترو-ميكانيكية دقيقة	2	0	2	3
2	BE354	Embedded Systems and Interfacing	الأنظمة المدمجة والواجهات	2	0	2	3
3	BE372	Safety in Biomedical Engineering	الأمان والسلامة في الهندسة الطبية	2	2	0	3
4	BE365	Biomedical Equipment 3	أجهزة طبية ٣	2	0	2	3
5	BE367	Biomedical Systems Design	تصميم الأنظمة الطبية الحيوية	2	0	2	3
6	BE374/ BE375	Elective 1 – Hospital Systems: Design & Management/ Management Systems and health care delivery	اختياري ١ – تصميم وإدارة مستشفيات\ نظم إدارة ورعاية صحية	2	2	0	3
				12	4	8	18

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Level 5 – Semester 1:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	BE403	Graduate Project 1	مشروع تخرج ١	2	0	0	2
2	BE453	Medical Image Processing	معالجة الصور الطبية	2	0	2	3
3	BE468	Medical 1maging System 1	نظم التصوير الطبي ١	2	0	2	3
4	BE471	Biomedical Equipment Maintenance	صيانة الأجهزة الطبية	2	0	2	3
5	BE475/ BE476	Elective 2 – Artificial Intelligence/ Robotics Principles and Applications in BME	اختياري ٢ – ذكاء اصطناعي\ مبادئ الروبوتات وتطبيقاتها	2	0/2	2/0	3
				10	0/2	8/6	14

Level 5 – Semester 2:

No	Course Code	Course Name	اسم المقرر	Th.	Tu.	Pr.	C.H.
1	BE404	Graduate Project 2	مشروع تخرج ٢	2	0	0	2
2	BE405	Field Attachments and Training	التدريب الميداني	0	0	0	0
3	BE469	Medical Imaging System 2	نظم التصوير الطبي ٢	2	0	2	3
4	BE477/ BE478	Elective 3 – Cell and Tissue Engineering/ Nuclear medicine techniques	اختياري ٣ – هندسة الخلايا والأنسجة\ تكنولوجيا الطب النووي	2	2	0	3
				6	2	2	8

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Distribution of Total Credit Hours:

Level	Term	University Requirements		Faculty Requirements		Basic Requirements		Program Requirements		Program Electives		General Courses		Training		Project		Total C.H.		Total C.H./Level
		No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	
First	First	4	9	2	7	2	6	-	-	-	-	-	-	-	-	-	-	8	22	42
	Second	4	8	1	3	3	9	-	-	-	-	-	-	-	-	-	-	8	20	
Second	First	-	-	-	-	2	5	4	13	-	-	1	3	-	-	-	-	7	21	41
	Second	-	-	1	2	1	3	5	15	-	-	-	-	-	-	-	-	7	20	
Third	First	-	-	-	-	1	2	5	15	-	-	1	3	-	-	-	-	7	20	39
	Second	-	-	-	-	-	-	6	19	-	-	-	-	-	-	-	-	6	19	
Fourth	First	-	-	1	2	-	-	5	16	-	-	-	-	-	-	-	-	6	18	36
	Second	-	-	-	-	-	-	5	15	1	3	-	-	-	-	-	-	6	18	
Fifth	First	-	-	-	-	-	-	3	9	1	3	-	-	-	-	1	2	5	14	22
	Second	-	-	-	-	-	-	1	3	1	3	-	-	1	0	1	2	4	8	
Total:		8	17	5	14	9	25	34	105	3	9	2	6	1	0	2	4	64	180	
Percentage:		9.4%		7.8%		13.9%		58.3%		5.0%		3.3%		0%		2.2%		100%		

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