Al Bayan University

جامعة البيان

كلية الهندسة

First Cycle – Bachelor's degree (B.Sc.) – Biomedical Engineering

بكالوريوس علوم - هندسة الطب الحياتي

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1. Mission & Vision Statement

Vision Statement

We aspire to build a department with both local and global recognition in the fields of biomedical engineering. This will be achieved through the continuous pursuit of knowledge, curriculum integration, structural robustness, and competition in the comprehensive development of the department at all levels. We aim to enhance current participation in biomedical engineering research in collaboration with prestigious universities, international conferences, and global journals in the field, while adhering to the cultural, scientific, and ethical values that prevail in society across generations, contributing to sustainable development in all aspects.

Mission Statement

The department aims to graduate engineering professionals with a Bachelor's degree in biomedical engineering who are capable of managing bioengineering-related systems, equipment, and applications effectively and efficiently. They will ensure the provision of high-quality medical engineering services and collaborate with medical professionals in hospitals and healthcare centers. Moreover, the department’s graduate studies and research projects focus on conducting modern practical research, ensuring a high level of theoretical and practical research capabilities to contribute to the country’s development.

Goals

The study period in the department is five years, including practical training in hospitals and maintenance centers during the summer vacation in the last two years of study, which provides the graduate with the ability to contribute to the following:

1. Design, manufacture, development and maintenance of medical devices and equipment in addition to medical measurement and diagnostic devices.
2. Design and manufacture of human prosthetic organs and properties of materials used in their manufacture.
3. Acquiring the basic skills that qualify him to prepare the requirements for designing modern hospitals and health centers and addressing doctors to cover the basic requirements and needs in the precise medical specialty.
4. Supervision of the medical engineer on all medical devices in all hospital departments, including operating room devices.
5. Managing the medical devices file, especially estimating the exact need according to the needs of the medical institution, setting the technical specifications for it, and discussing with the specialized companies the optimal mechanism for working on these devices.
6. Setting technical standards for accrediting companies specialized in importing medical devices that deal with the Ministry of Health according to modern scientific foundations that take into account the medical and engineering fields.
7. Working on implementing the quality system for the operation of medical devices, medical equipment and occupational safety.

2. Program Specification

Program code:	BSc-BME	**ECTS**	300
Duration:	5 levels, 10 Semesters	**Method of Attendance:**	Full Time

Biomedical engineers use their technological knowledge and understanding to improve human lives. In this Program, you will gain the technical expertise to design, develop, and optimize innovative medical devices and technologies that improve patient care and advance the field of healthcare. The Program prepares graduates to work in a wide range of technology areas from imaging and diagnosis to monitoring and treatment.

In the core modules, you will learn the basics of engineering math, electronics and mechanics, programming skills, statistical and data analysis tools in the first two years. Through elective modules, you will have the option to learn about a diverse range of topics relevant to diagnosis and treatment of disease, biomechanics and development of medical devices. Program-specific core topics are covered at Level 3 preparing for research-led subject specialist modules at Levels 4 and 5.

In addition to the main Program content, the department hold regular seminars and workshops, practical training in hospitals and maintenance centers during the summer vacation in the last two

years of study to deepen and broaden your understanding of the Bioengineering field. Students would be also facilitated to visit hospitals and healthcare centers to acquire acquaintance of medical tools and equipment.

3. Program Goals

Understanding of Human Anatomy and Physiology: Biomedical engineering graduates are expected to have a solid understanding of human anatomy and physiology, including the structure and function of various organs and systems in the human body.

Systems Physiology and Modeling: Graduates should have a solid understanding of human physiology and the ability to model physiological systems. This includes knowledge of cardiovascular, respiratory, neurological, and musculoskeletal systems, and the ability to develop mathematical models to simulate and analyze physiological processes.

Medical Instrumentation and Equipment: Graduates should be familiar with the design, operation, and maintenance of medical instruments and equipment used in healthcare settings. This includes knowledge of medical imaging systems, monitoring devices, prosthetics, and other medical devices.

Biomechanics and Biomaterials: Graduates should have knowledge of biomechanical principles and biomaterials used in biomedical applications. This includes understanding the mechanical behavior of biological tissues, the interaction between materials and the human body, and the selection and evaluation of biomaterials for specific purposes.

Medical Imaging and Signal Processing: Biomedical engineering graduates should be familiar with various medical imaging modalities such as X-ray, ultrasound, magnetic resonance imaging (MRI), and computed tomography (CT). They should also possess skills in signal processing techniques to extract and analyze information from medical images and signals.

Medical Device Design and Development: Graduates should have the ability to design and develop medical devices and systems. This involves understanding user needs, translating them into engineering specifications, conducting prototyping and testing, and ensuring compliance with regulatory standards.

Design and Innovation: Biomedical engineering graduates should be capable of designing innovative solutions to address healthcare challenges. This includes skills in problem identification, needs assessment, concept generation, prototyping, and testing.

Biomedical Data Analysis: Graduates should be competent in analyzing and interpreting biomedical data, such as physiological signals, patient records, and clinical trial data. This includes skills in statistical analysis, data mining, and bioinformatics.

Regulatory Compliance and Ethical Considerations: Graduates should be aware of the regulatory frameworks and standards governing the development and use of medical devices and technologies.

They should also have a strong understanding of ethical considerations, including patient privacy, informed consent, and the responsible use of biomedical technologies.

Research and Innovation: Biomedical engineering graduates should be prepared to engage in research activities and contribute to the advancement of knowledge in the field. This involves skills in experimental design, data collection and analysis, and the ability to critically evaluate scientific literature.

4. Student Learning Outcomes

A biomedical engineering graduate is prepared for a career in today's marketplace and positioned to meet the possible challenges of the future. They are an adaptable problem solver with experience using their expertise to synthesize engineering solutions.

Outcome 1

Engineering Knowledge

Biomedical engineering graduates should have a solid understanding of the foundational principles and concepts of engineering and their application to biomedical systems.

Outcome 2

Problem Solving

Graduates should be able to identify, formulate, and solve engineering problems, including those related to biomedical systems. This involves analyzing problems, designing and implementing solutions, and evaluating their effectiveness.

Outcome 3

Design and Development of Solutions

Biomedical engineering graduates should be capable of designing systems, components, or processes to meet specific needs within realistic constraints, considering factors such as safety, ethics, and societal impacts.

Outcome 4

Experimentation and Data Analysis

Graduates should be proficient in designing and conducting experiments, as well as analyzing and interpreting data to draw meaningful conclusions and make informed engineering decisions.

Outcome 5

Teamwork and Communication

Biomedical engineers often work as part of multidisciplinary teams. Graduates should be able to effectively collaborate and communicate with team members from diverse backgrounds to achieve common goals.

Outcome 6

Professionalism and Ethics

Biomedical engineers should demonstrate professionalism, ethical behavior, and responsibility in their engineering practice. They should understand the societal and environmental impacts of their work and make ethical decisions accordingly.

Outcome 7

Lifelong Learning

Given the rapidly evolving nature of technology and healthcare, biomedical engineers should have a commitment to continuous learning and professional development throughout their careers. They should be able to engage in self-directed learning and adapt to new technologies and practices.

5. Academic Staff

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6. Credits, Grading and GPA

Credits

Al Bayan University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 300, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   CGPA of a 5-year B.Sc. degree:

   CGPA = [(1st ^{m}odule score x ECTS) + (2nd ^{m}odule score x ECTS) + ……] / 300

7. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CREQ180	Chemistry	79	46	5.00	B	
MATH110	Mathematics I	78	47	5.00	B	
UREQ111	Computer Fundamentals and Programming I	63	37	4.00	B	
CREQ110	Engineering Drawings I	63	62	5.00	S	
BIOL110	Biology	48	52	4.00	B	
MDER110	Electrical Circuits I	94	31	5.00	B	
HUDE110	Human Rights+ Democracy	33	17	2.00	S	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PHYS110	Physics	93	57	6.00	B	
MATH120	Mathematics II	78	72	6.00	B	
URBRC 1	Arabic	33	17	2.00	B	
CREQ120	Engineering Graphics	78	47	5.00	S	
URENG1	English Language	33	17	2.0	B	
MDER120	Electrical Circuits II	94	56	6.00	B	
CREQ120	Workshop	48	2	3.00	B	

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MDER210	Electronics I	94	56	6.00	C	
MDER211	Engineering Mechanics I	78	72	6.00	B	MATH110
URARA2	Arabic 11	33	17	2.00	B	MATH110
URENG2	English Language 11	33	17	2.00	B	
MDER213	Anatomy I	94	31	5.00	C	
MATH210	Mathematics III	78	72	6.00	B	
CREQ122	Crimes of Defunced Baath Party	33	17	2.00	S	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MDER220	Electronics II	124	26	6.00	C	MDER120
MDER221	Engineering Mechanics II	93	32	5.00	B	MATH120
MDER222	Anatomy II	79	46	5.00	C	
MATH220	Mathematics IV	78	72	6.00	B	
MDER223	Introduction to BME	33	67	4.00	C	
UREQ121	English I+II	48	52	4.00	S	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MDER310	Elective I	48	52	4.00	E	
MDER311	Engineering Analysis	78	47	5.00	C	
MDER312	Optical Systems Design	63	37	4.00	C	PHYS110
MDER313	Physiology I	79	46	5.00	C	
MDER314	Medical Measurement Instrumentation	94	56	6.00	C	MDER210
MDER315	Biomaterials I	93	57	6.00	C	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CREQ320	Engineering Statistics	63	62	5.00	S	MATH110
MDER320	Mechanics of Materials	123	27	6.00	C	MDER211
MDER321	Physiology II	79	46	5.00	C	
MDER322	Therapeutic Instrumentation	79	71	6.00	C	
MDER323	Biomaterials II	63	37	4.00	C	
UREQ320	English III+IV	48	52	4.00	S	

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MDER410	Elective II	63	37	4.00	E	
MDER411	Biomechanics I	79	71	6.00	C	MDER211
MDER412	Signal Processing	63	37	4.00	C	
MDER413	Digital Electronics I	78	47	5.00	C	
MDER414	Histo-pathology	109	41	6.00	C	MDER212
MDER415	Medical Imaging Instruments I	63	62	5.00	C	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MDER420	Bio-Fluid Mechanics	78	22	4.00	C	
MDER421	Biomechanics II	79	71	6.00	C	MDER221
MDER422	Medical Communications	94	56	6.00	C	MDER311
MDER423	Image Processing	63	37	4.00	C	
MDER424	Digital Electronics II	78	47	5.00	C	
MDER425	Medical Imaging Instruments II	63	62	5.00	C	

Semester 9 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UREQ520	Engineering Management + Principles of Management	78	22	4.00	S	
CREQ510	Project	93	57	6.00	C	
MDER510	Control I	79	46	5.00	C	MDER311
MDER511	Diagnostic Medical Equipment	79	46	5.00	C	MDER414
MDER512	Elective III	63	62	5.00	E	
MDER513	Elective IV	63	62	5.00	E	

Semester 10 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UREQ211	Professional Ethics	33	42	3.00	S	
CREQ510	Project	94	56	6.00	C	
MDER520	Control II	94	56	6.00	C	MDER311
MDER521	Artificial Organs and Prostheses	78	72	6.00	C	
MDER522	Biomedical Sensors	78	47	5.00	C	MDER210
MDER523	Elective V	78	22	4.00	E	

8. Contact

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