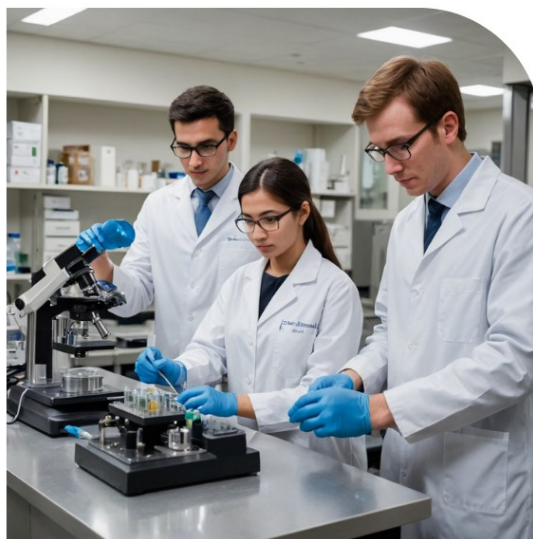


Republic of Iraq
Ministry of Higher Education
& Scientific Research
Alayen Iraqi University AUIQ
College Of Engineering
Department of Biomedical



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة العين العراقية
كلية الهندسة
قسم هندسة الطب الحيوي

دليل البرنامج الدراسي | 2024-2025 | Program Guide



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

بكالوريوس – هندسة طب حيوي

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الاتصال

1. Mission & Vision Statement

Vision:

Creating a distinguished generation in medical engineering locally and internationally, who have the scientific knowledge and skills to achieve professional competition and keep pace with technological progress, enhance self-confidence and creativity, improve efficiency and are ethically committed.

Mission:

Preparing a distinguished graduate professionally and in research, capable of competing and developing performance locally and globally in the field of biomedical engineering and related fields through high-quality academic programs, and developing a sense of community participation while adhering to professional ethics.

The field encompasses a broad range of activities, and the mission of biomedical engineering can be summarized as follows:

- i. **Development of Innovative Solutions:** Biomedical engineers work to provide creative solutions for healthcare problems.
- ii. **Integration of Engineering and Medicine:** Biomedical engineering seeks to bridge the gap between engineering and medicine by combining scientific knowledge, engineering principles, and medical expertise. The mission is to integrate these disciplines to develop effective and safe healthcare solutions.
- iii. **Collaboration and Interdisciplinary Research:** Biomedical engineers work collaboratively with healthcare professionals, scientists, and researchers from various fields. The mission is to foster interdisciplinary research and collaboration to tackle complex biomedical problems and advance medical knowledge.
- iv. **Improving Health Outcomes:** Biomedical engineering aims to improve health outcomes by developing technologies and approaches that enable early and accurate diagnosis, effective treatments, and improved patient care. This includes developing tools for personalized medicine, precision therapies, and advanced imaging techniques.
- v. **Enhancing Quality of Life:** Biomedical engineers work to enhance the quality of life for individuals with disabilities or medical conditions. This involves designing and developing assistive technologies, rehabilitation devices, and prosthetics to improve mobility, communication, and overall well-being.
- vi. **Ethical and Responsible Practice:** Biomedical engineers are committed to upholding high ethical standards in their work. The mission is to ensure the responsible and safe use of technologies, protection of patient privacy, and adherence to regulatory guidelines.
- vii. **Education and Training:** Biomedical engineering promotes education and training programs to equip future professionals with the knowledge and skills required for the field. The mission is to foster the development of competent and ethical biomedical engineers who can contribute to advancing healthcare.

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

- PEO1.** Commit to practicing responsible, professional, and ethical conduct in biomedical engineering, ensuring the highest standards for graduate and your community.
- PEO2.** Embrace continuous professional development and actively acquire new skills, unlocking diverse job opportunities across interdisciplinary engineering sectors.
- PEO3.** Engage in community service and strive to become influential leaders in your industry, making a positive impact on society.
- PEO4.** Have the ability to design medical devices that meet desired need.

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. Credits, Grading and GPA

Credits

Al-Ayen Iraqi 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)

- 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:

$$\text{CGPA} = [(1\text{st module score} \times \text{ECTS}) + (2\text{nd module score} \times \text{ECTS}) + \dots] / 300$$

6. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
One	CREQ180	Chemistry	الكيمياء		2	5.00	B	
	MATH110	Mathematics	الرياضيات	4		5.00	B	
	URCOM111	Computer Fundamentals and Programming	برمجة الحاسب الآلي	2	2	4.00	B	
	CREQ110	Engineering Drawings	الرسم الهندسي	1	2	5.00	S	
	BIOL110	Biology	الاحياء	2		4.00	B	
	MDER110	Electrical Circuits I	الدوائر الكهربائية 1	2	3	5.00	B	
	URDEM110	Human Rights+ Democracy	حقوق الانسان والديمقراطية	2		2.00	S	
				16	9	30.00		

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
Two	PHYS110	Physics	الفيزياء	3	2	6.00	B	
	MATH120	Fundamentals of Engineering Mathematics	أساسيات الرياضيات الهندسية	4		6.00	B	
	CREQ121	Computer Fundamentals and Programming II	برمجة الحاسب الآلي 2	2	2	5.00	B	
	CREQ120	Engineering Graphics	الاطهار الهندسي	2	2	5.00	S	
	MDER120	Electrical Circuits II	الدوائر الكهربائية 2	3	2	6.00	B	
	UREQ110	Workshop	تكنولوجيا الورش			2.00	B	
				14	8	30.00		

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
Three	MDER210	Fundamentals of Electronics	أساسيات الإلكترونيك	4	3	6.00	C	
	MDER211	Engineering Mechanics (Static)	الميكانيك الهندسي (الساكن)	4		7.00	B	
	URENG1	English Language	اللغة الانكليزية	2		2.00	B	
	MDER213	Thorax and Limbs Anatomy	تشريح الصدر والاطراف	2	2	5.00	C	
	MATH210	Engineering Mathematics	رياضيات هندسية	4		6.00	B	
	URBRC	Crimes of Defunct Baath Party	جرائم نظام البعث في العراق	2		2.00	B	
	URARA	Arabic	اللغة العربية	2		2.00	B	
				20	5	30		

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
Four	MDER220	Electronic Circuits	الدوائر الالكترونية	2	3	5.00	C	
	MDER221	Engineering Mechanics (Dynamics)	الميكانيك الهندسي (الحركي)	5		5.00	B	
	MDER222	Abdomen and Head Anatomy	تشريح البطن والراس	2	2	5.00	C	
	MATH220	Analytic Mathematics	رياضيات تحليلية	4		6.00	B	
	MDER223	Introduction to BME	مقدمة في الهندسة الطبية	2		3.00	C	
	MANG220	Principle of Management	مبادئ الادارة	2		2.00	S	
	URENG2	Academic English Language	اللغة الانكليزية الاكاديمية	2		2.00	B	
	URARA2	Arabic II	اللغة العربية 2	2		2.00	B	
				21	5	30		

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs.

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
Five	MDER310	Elective I	مواد مختارة 1	2		4.00	E	
	MDER311	Engineering Analysis	التحليلات الهندسية	4		5.00	C	
	MDER312	Optical Systems Design	تصميم التقنيات البصرية	3		4.00	C	
	MDER313	Systemic Physiology	فسلجة اجهزة الجسم	2	3	5.00	C	
	MDER314	Medical Measurement Instrumentation	اجهزة القياس الطبية	3	2	6.00	C	MDER220
	MDER315	Biomaterials	المواد الحيوية	3	2	6.00	C	
				17	7	30.00		

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs.

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
Six	STAT320	Statistics	الاحصاء	3		5.00	B	
	MDER320	Mechanics of Materials	ميكانيك المواد	4	2	6.00	C	MDER221
	MDER321	Regional Physiology	الفسلجة الموقعية	2	3	5.00	C	
	MDER322	Therapeutic Instrumentation	الاجهزة العلاجية	3	2	6.00	C	
	MDER323	Biomaterials Applications	تطبيقات المواد الحيوية	4		4.00	C	
	MDER324	Numerical Analysis	التحليلات العددية	2	2	4.00	S	
				18	9	30.00		

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs.

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s)
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								Code
Seven	STAT320	Statistics	الاحصاء	3		5.00	E	
	MDER320	Mechanics of Materials	ميكانيك المواد	4	2	6.00	C	
	MDER321	Regional Physiology	الفسلجة الموقعية	2	3	5.00	C	
	MDER322	Therapeutic Instrumentation	الاجهزة العلاجية	3	2	6.00	C	
	MDER323	Biomaterials Applications	تطبيقات المواد الحيوية	4		4.00	C	MDER212
	MDER324	Numerical Analysis	التحليلات العددية	2	2	4.00	C	
				18	9	30.00		

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs.

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
Eight	MDER420	Bio-Fluid Mechanics	ميكانيك الموائع الحيوية	5		4.00	C	
	MDER421	Biomechanics of Motion	الميكانيك الاحيائي الحركي	3	2	6.00	C	MDER221
	MDER422	Medical Communications	الاتصالات الطبية	3	3	6.00	C	
	MDER423	Image Processing	معالج الصور	2	2	4.00	C	
	MDER424	Sequential Digital Electronics	الإلكترونيك الرقمي التتابعي	2	2	5.00	C	
	MDER425	Medical Imaging Instruments Applications	تطبيقات اجهزة التصوير الطبية	2	2	5.00	C	
				17	11	30.0		

Semester 9 | 30 ECTS | 1 ECTS = 25 hrs.

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
Nine	UREQ520	Engineering Management	الادارة الهندسية	4		4.00	S	
	PROJ411	Project I	مشروع التخرج 1		6	4.00	C	
	MDER510	Classic Control	السيطرة الكلاسيكية	3	2	6.00	C	MDER311
	MDER511	Diagnostic Medical Equipment	الاجهزة التشخيصية	2	2	6.00	C	MDER414
	MDER512	Elective III	مواد مختارة 3	4		5.00	E	
	MDER513	Elective IV	مواد مختارة 4	4		5.00	E	
				17	10	30.0		

Semester 10 | 30 ECTS | 1 ECTS = 25 hrs.

Semester	Module Code	Module Name in English	اسم المادة الدراسية	CL (hr/w)	Lab (hr/w)	ECTS	Module Type	Prerequisite Module(s) Code
Ten	PRET310	Professional Ethics	اخلاقيات المهنة	2		3.00	S	
	PROJ422	Project I	مشروع التخرج 2		6	4.00	C	
	MDER520	Modern Control	السيطرة الحديثة	3	2	6.00	C	MDER311
	MDER521	Artificial Organs and Prostheses	الاعضاء الصناعية البديلة	4		6.00	C	
	MDER522	Biomedical Sensors	المتحسسات الاحيائية	3		6.00	C	MDER210
	MDER523	Elective V	مواد مختارة 5	4		5.00	E	
				16	8	30.0		

Module type	B	Basic learning activities	SWL:	Student Workload
	C	Core learning activity	SSWL:	Structured SWL
	S	Support or related learning activity	USSWL:	Unstructured SWL
	E	Elective learning activity		

7. Academic Staff

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