Republic of Iraq
Ministry of Higher Education & Scientific Research
Supervision and Scientific Evaluation Directorate
Quality Assurance and Academic Accreditation
International Accreditation Dept.

Academic Program Specification Form For The Academic Year 2021

University: University of Baghdad
College : AlKhwarizmi College of Engineering
Number Of Departments In The College : Five Departments
Date Of Form Completion :

Dean's Name

Date : / / 2021

Signature

Dean's Assistant For Scientific Affairs

Date : / / 2021
Signature

The College Quality Assurance And University Performance Manager

Date : / / 2021
Signature

Quality Assurance And University Performance Manager
Date : / / 2021
Signature

TEMPLATE FOR PROGRAM SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAM REVIEW

PROGRAM SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University of Baghdad / Alkhwarizmi College of Engineering
2. University Department/Centre	Biomedical Engineering Department
3. Program Title	B.Sc. Biomedical Engineering
4. Title of Final Award	B.Sc. Biomedical Engineering
5. Modes of Attendance offered	Full Time
6. Accreditation	ABET
7. Other external influences	None
8. Date of production/revision of this specification	2021
9. Aims of the Program	

This program aims to support the health sector in the country with specialized engineers who are needed to improve methods for the medical care patients and the fruitful usage of engineering in the field of medicine.
The program is dedicated to preparing the graduated engineers for the professional employment in areas such as the medical device industry, engineering consulting, biomechanics, biomedical imaging and signal processing, and biotechnology.
The professional Biomedical Engineer requires a sound knowledge of the engineering principles and other skills of engineering science in parallel with their application in the biomedical field. These engineering skills include modeling of systems, mechanical analysis, electrical and electronic circuits, medical imaging, biomaterials and biomechanics. These skills will be brought together in the design projects through the degree and in the penultimate year group project and final year project. The Biomedical Engineering degree will allow the graduate to progress into a career in biomedical engineering or engineering or into the research field based on the knowledge developed throughout the degree. Furthermore the graduate will be equipped to develop their skills through continued personal development.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

Graduates will be able to:

A1. Use their knowledge and understanding of the appropriate mathematical, scientific and computational tools that underpin Biomedical Engineering, to solve, in depth, analytical, design or theoretical problems in the field of Biomedical Engineering;

A2. Apply their knowledge and understanding of physical and biological laws, mathematics and numerical analysis in order to model Biomedical Engineering and similar systems;

A3. Draw on materials from a range of courses and wider reading in Biomedical Engineering principles and in Mechanical, Electrical and Biomedical Engineering and the Biological Sciences in order to solve problems in Biomedical Engineering including demonstrating depth and breadth to their learning;

A4. Explain the role of Biomedical Engineers in society and the constraints within which their engineering judgment will be exercised.

B. Subject-specific skills

B1. Plan and execute safely a series of experiments in both the engineering and biomedical context;

B2. Design, from requirement, market need or specification, a biomedical engineering device implant or system, up to the preliminary design stage, and present this design via a series of poster, written and oral presentations from both group and individual work;

B3. Use laboratory and workshop equipment to generate data, including both engineering and physiological measurements, with appropriate rigor;
B4. Prepare technical drawings and technical reports;
B5. Write computer programs and use computational tools and packages, selecting the appropriate "state of the art" tools to solve Biomedical Engineering problems.

Teaching and Learning Methods

Staff involved in the degree program utilize a wide range of teaching methods that they deem the most appropriate for a particular course. These include:
• Lectures where the students write information presented to them via slide show, overhead or written by the lecturer;
• Lectures where the students have some printed notes/handouts and may annotate, or expand these during a spoken lecture;
• Lecture material placed on web-pages or other e-learning environment;
• Small group and large group tutorial sessions;
• Question and answer sessions during lectures or staff Office Hours;
• Laboratory sessions.

Assessment methods

Assessment Methods to be used are:
• Written examinations (Summative assessment);
• Oral presentations of individual and group work;
• Individual written project report(s) of both individual and group projects;
• Homework;
• Take home exams;
• Practical skills will be assessed through laboratory experiments, write-ups, coursework reports, project reports and presentations;
• Experimental, research and design skills will be assessed through laboratory experiments write-ups, coursework reports, project reports and presentations;
• Presentation skills through group presentations and poster presentations.

C. Thinking Skills

C1. Apply appropriate quantitative mathematical, scientific and engineering tools to the analysis of problems;
C2. Analyze and solve engineering problems;
C3. Design a Biomedical Engineering system, component or process to meet a need;
C4. Integrate knowledge and understanding of other scientific, mathematical, computational or engineering disciplines in order to support their engineering specialization.

Teaching and Learning Methods

• External lectures from industry or clinicians;
• Feedback given to students during tutorials;
• Small group and large group tutorial sessions;
• Question and answer sessions during lectures or staff Office Hours;
• Guided reading of texts, journal articles etc., for individual and group projects;
• Completion of web-based exercises or computer based laboratory sessions;

Assessment methods

• Individual written project report(s) of both individual and group projects;
• Group written project report(s) of group projects;
• Interview of group project manager and assessment of group project minutes;
• Poster presentation of group project work;
• Practical skills will be assessed through laboratory experiments, write-ups, coursework reports, project reports and presentations;
• Experimental, research and design skills will be assessed through laboratory experiments write-ups, coursework reports, project reports and presentations;
• Presentation skills through group presentations and poster presentations.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Apply in depth problem solving and analytical thinking to a diverse range of problems;
D2. Use appropriate multi-disciplinary skills to solve Biomedical Engineering problems, combining the biological and engineering knowledge gained through the degree;
D3. Demonstrate numeracy and literacy in written reports, project work and examinations;
D4. Learn effectively for the purpose of continuing professional development and in a wider context throughout their career.

Teaching and Learning Methods

• Lectures where the students have some printed notes/handouts and may annotate, or expand these during a spoken lecture;
• Lecture material placed on web-pages or other e-learning environment;
• External lectures from industry or clinicians;
• Small group and large group tutorial sessions;
• Question and answer sessions during lectures or staff Office Hours;
• Guided reading of texts, journal articles etc., for individual and group projects;
• Completion of web-based exercises or computer based laboratory sessions.

Assessment Methods

• Group written project report(s) of group projects;
• Interview of group project manager and assessment of group project minutes;
• Poster presentation of group project work;
• Practical skills will be assessed through laboratory experiments, write-ups, coursework reports, project reports and presentations;
• Experimental, research and design skills will be assessed through laboratory experiments write-ups, coursework reports, project reports and presentations;
• Presentation skills through group presentations and poster presentations.

11. Program Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit Rating	
First Year	BME121	Mathematics I	6	Bachelor Degree Requires (190) credits
First Year	BME131	Introduction to Biomedical Engineering	6	
First Year	BME132	Electronic Physics	4	
First Year	BME133	Engineering Mechanics	6	
First Year	BME122	Electrical Circuits	6	
First Year	BME123	Computer Science	4	
First Year	BME111	English	2	
First Year	BME112	Human Rights	2	
First Year	BME124	Engineering Drawing	4	
Second Year	BME221	Mathematics II	6	
Second Year	BME222	Anatomy I	6	
Second Year	BME231	Biomaterial Science	4	

Second Year	BME232	Mechanics of Materials and Vibrations	6	
Second Year	BME233	Digital Techniques	4	
Second Year	BME234	Network and Digital Lab.	2	
Second Year	BME223	Biochemistry	6	
Second Year	BME211	Arabic	2	
Second Year	BME212	Freedom and Democracy	2	
Third Year	BME321	Anatomy II	6	
Third Year	BME322	Engineering and Numerical Analysis	4	
Third Year	BME331	Microelectronics	4	
Third Year	BME323	Computer Aided Design	4	
Third Year	BME332	Bioelectromagnetics	4	
Third Year	BME333	Biofluid and Thermodynamics	4	
Third Year	BME324	Neourobiology and Biology	6	
Third Year	BME341	Microwave, X-Rays and Gamma-Rays	4	
Third Year	BME334	Electronic Circuit Lab.	2	
Fourth Year	BME431	Artificial Limbs and Biotribology	4	
Fourth Year	BME441	Machine Design	6	
Fourth Year	BME442	Control System Design	6	
Fourth Year	BME443	Integrated Optics and Laser	4	
Fourth Year	BME432	Microprocessors and Microcomputers	4	

Fourth Year	BME444	Signal Processing	6	
Fourth Year	BME445	Medical Instrumentation and System I	4	
Fourth Year	BME446	Medical Measurements	2	
Fifth Year	BME541	Physiological Control and System	6	
Fifth Year	BME542	Clinical Engineering	4	
Fifth Year	BME543	Bio-digital Signal Processing	4	
Fifth Year	BME544	Medical Imaging	6	
Fifth Year	BME545	Biomedical Sensor	6	
Fifth Year	BME546	Medical Instrumentation and System II	6	
Fifth Year	BME547	Medical Engineering Lab.	2	
Fifth Year	BME548	Engineering Project	4	

13. Personal Development Planning

Personal Development Planning is developed across the degree, it is an integral part of the Biomedical Engineering Department, it is delivered and monitored through the personal tutor system. In specific modules the student will be encouraged to review and reflect upon progression and develop an awareness of the personal and professional needs, to reflect and develop skills relevant to the role of the biomedical engineer. Academic skills alone are clearly insufficient to meet the demands of the biomedical engineer. The development of additional interpersonal qualities is essential to enable students to initiate, direct and control events effectively. To help students develop these skills, many of the tutorial activities and assignment work will provide them with the opportunity for practical project work, the development of problem solving skills and discussion and critical appraisal. Students are required to make oral presentations at intervals throughout their course.

14. Admission criteria.
Applicants will normally be required to have passed the Baccalaureate Examination of the Secondary School / Scientific Branch according to the regulations stated by the Ministry of Higher Education and Scientific Research.
15. Key sources of information about the program
Ministry of Higher Education and Scientific Research www.en.mohesr.gov.iq University of Baghdad www.en.uobaghdad.edu.iq Al-Khwarizmi College of Engineering www.kecbu.uobaghdad.edu.iq

Curriculum Skills Map																			
please tick in the relevant boxes where individual Program Learning Outcomes are being assessed																			
				Program Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills					Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2	D3	D4
First Year	BME121	Mathematics I	C																	
	BME131	Introduction to Biomedical Engineering	C																	
	BME132	Electronic Physics	C																	
	BME133	Engineering Mechanics	C																	
	BME122	Electrical Circuits	C																	
	BME123	Computer Science	C																	
	BME111	English	C								√									
	BME112	Human Rights	C																	
	BME124	Engineering Drawing	C																	
Second Year	BME221	Mathematics II	C																	
	BME222	Anatomy I	C																	
	BME231	Biomaterial Science	C																	

	BME232	**Mechanics of Materials and Vibrations**	**C**																
	BME233	**Digital Techniques**	**C**																
	BME234	**Network and Digital Lab.**	**C**																
	BME223	**Biochemistry**	**C**																
	BME211	**Arabic**	**C**																
	BME212	**Freedom and Democracy**	**C**																
Third Year	**BME321**	**Anatomy II**	**C**																
	BME322	**Engineering and Numerical Analysis**	**C**																
	BME331	**Microelectronics**	**C**																
	BME323	**Computer Aided Design**	**C**																
	BME332	**Bio-electromagnetics**	**C**																
	BME333	**Biofluid and Thermodynamics**	**C**																
	BME324	**Neurobiology and Biology**	**C**																
	BME341	**Microwave, X-Rays and Gamma-Rays**	**C**																

	BME334	**Electronic Circuit Lab.**	**C**																
Fourth Year	**BME431**	**Artificial Limbs and Biotribology**	**C**																
	BME441	**Machine Design**	**C**																
	BME442	**Control System Design**	**C**																
	BME443	**Integrated Optics and Laser**	**C**																
	BME432	**Microprocessors and Microcomputers**	**C**																
	BME444	**Signal Processing**	**C**																
	BME445	**Medical Instrumentation and System I**	**C**																
	BME446	**Medical Measurements**	**C**																
Fifth Year	**BME541**	**Physiological Control and System**	**C**																
	BME542	**Clinical Engineering**	**C**																
	BME543	**Bio-digital Signal Processing**	**C**																
	BME544	**Medical Imaging**	**C**																
	BME545	**Biomedical Sensor**	**C**																

	BME546	**Medical Instrumentation and System II**	**C**																
	BME547	**Medical Engineering Lab.**	**C**																
	BME548	**Engineering Project**	**C**																

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	The Ministry of Higher Education
2. University Department/Centre	Baghdad University/Biomedical Engineering Department
3. Course title/code	Math-II/ **BME111**
4. Programme(s) to which it contributes	
5. Modes of Attendance offered	
6. Semester/Year	semester
7. Number of hours tuition (total)	62 hours
8. Date of production/revision of this specification	٢٠١٨-١٠
9. Aims of the Course	
This course give the student the knowledge about the theory and application of math to solve engineering problems that related to all important calculations such as vector in space, polar function, function of two variables, differential equation, sequences and series and so on….make the student imagine and think with intelligent solution for practical problems in his work in future..	

10· Learning Outcomes, Teaching ,Learning and Assessment Methode
A- Knowledge and Understanding A1. A2. A3. A4. A5. A6 .
B. Subject-specific skills B1. B2. B3. B4. √
Teaching and Learning Methods
Assessment methods
Homework
C. Thinking Skills C1. C2. C3. C4.
Teaching and Learning Methods
• Question and answer sessions during lectures or staff Office Hours; • Guided reading of texts, journal articles etc., for individual and group projects
Assessment methods
Individual written project report(s) of both individual and group projects

D. General and Transferable Skills (other skills relevant to employability and personal development) D1. D2. D3. D4.
Teaching and Learning Methods
• Lectures where the students have some printed notes/handouts and may annotate, or expand these during a spoken lecture; • Question and answer sessions during lectures or staff Office Hours; • Guided reading of texts, journal articles etc., for individual and group projects;
Assessment methods

11. Course Structure(**Second semester)**					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	٤		Hyperbolic functions: the functions and their inverse	Lecture on white board	Daily exam(paper& oral
2	٤		Relation to the logarithmic function, derivative and integration, the catenaries	Lecture on white board	Daily exam(paper& oral
3	٤		Exam	Lecture on white board	Daily exam(paper& oral
4	٤		Partial derivative: (functions of two or more independent variables, limit and continuity	Lecture on white board	Daily exam(paper& oral
5	٤		Partial derivatives, differentiable functions, total differentia, chain rule	Lecture on white board	Daily exam(paper& oral
6	٤		Jacobian, normal lines and tangent planes to surfaces, the gradient of a function	Lecture on white board	Daily exam(paper& oral
7	٤		Sequences and infinite series: convergence of a sequence	Lecture on white board	Daily exam(paper& oral
8	٤		Bounded and monotomic sequence, subsequences	Lecture on white board	Daily exam(paper& oral
9	٤		Power series	Lecture on white board	Daily exam(paper& oral
10	٤		Tylors theorem	Lecture on white board	Daily exam(paper& oral
11	٤		Differential equation: the order, degree	Lecture on white board	Daily exam(paper& oral
12	٤		Special and general solution	Lecture on white board	Daily exam(paper& oral
13	٤		Divergence and curl of a vector valued, exact differential, max and min with constrains	Lecture on white board	Daily exam(paper& oral
14	٤		Multiple integrals: the double integral as a limit of sum	Lecture on white board	Daily exam(paper& oral
15	٤		Exam		

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	CALCULUS BY THOMAS Howard Advanced Math by Wiley
Special requirements (include for example workshops, periodicals, IT software, websites)	

Community-based facilities (include for example, guest Lectures , internship , field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	٢٠
Maximum number of students	٤٠