TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAMME SPECIFICATION

This Programme Specification provides a concise summary of the main features of the programme 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 programme.

1. Teaching Institution	University of Baghdad / Alkhwarizmi College of Engineering
2. University Department/Centre	Biomedical Engineering Department
3. Programme 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	
9. Aims of the Programme	
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

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.

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.

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 programme

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 Programme Learning Outcomes are being assessed																			
				Programme 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**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
4	**BME411**	**Design control systems**	**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	Baghdad University- Al-Khwarizmi College of Engineering
2. University Department/Centre	Biomedical Engineering
3. Course title/code	Design control systems / BME421
4. Programme(s) to which it contributes	BSc in Biomedical Engineering
5. Modes of Attendance offered	Full time attendance
6. Semester/Year	One Semesters per year
7. Number of hours tuition (total)	45 hrs. + 30 hrs practical
8. Date of production/revision of this specification	18th - Feb. 2019
9. Aims of the Course	
In this course, the students will learn how to use time and frequency response methods in designing control systems. First, we start with understanding the concept of Root-Locus method and then we move on and learn how to use this method in designing phase-lead, phase lag, Lead-lag compensators. We will then utilize the design procedures for tuning P, PD, PI, and PID controllers. At this point, we would cover a good chunk of material in time domain analysis. It's time to convey our learning journey to the frequency domain. To do so, we will analyze the control systems in the frequency domain using Bode diagrams, polar plot, Nyquist plot, and Nicholas plot. These graphical techniques are essential in	

analyzing the stability of the systems in the frequency domain as well as in designing the control systems. If we have enough time, we probably introduce the concept of state - space analysis in control systems.
This course has 2 hours lab where the theoretical knowledge will be elaborated using Matlab software.

10· Learning Outcomes, Teaching ,Learning and Assessment Methods

A- Knowledge and Understanding

A1
A2
A3

B. Subject-specific skills

B1
B2
B3
B4

Teaching and Learning Methods

• Lectures where the students write information presented to them via slide show, or written by the lecturer;
• 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;
• Laboratory sessions.

Assessment methods

• Written examinations (Summative assessment);
• Oral presentations of individual and group work;
• Homework;
• Practical 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
C2
C3
C4

Teaching and Learning Methods

External lectures from industry or clinicians;
• Feedback given to students during tutorials;
• Question and answer sessions during lectures or staff Office Hours;
• Completion of web-based exercises or computer based laboratory sessions;

Assessment methods

Individual written project report(s) of both individual and group projects;
• Practical 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
D2
D3

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;
• Question and answer sessions during lectures or staff Office Hours;

Assessment Methods

• Practical skills will be assessed through laboratory experiments, write-ups, coursework reports, project reports and presentations;
• Presentation skills through group presentations and poster presentations.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
١	3		Root – locus method (1)		
٢	3		Root – locus method (2)		Written test
٣	3		Design via root-locus method (Phase lead - PD)		Written test
٤	3		Design via root-locus method (Phase Lag -PI)		
٥	3		Design via root-locus method (lead - lag) - PID		Written test
٦	3		Frequency Response Analysis		
٧	3		Bode Plot (1) and system characteristics		
٨	3		Bode plot (2) System identification -		
٩	3		Polar and Nyquist plot		
١٠	3		Mid-term exam		
١١	3		Design using Bode plot (1)		
١٢	3		Design using Bode plot (1)		Written test
١٣	3		Introduction to control systems analysis in state space (system modeling in state space)		
١٤	3		Introduction to control systems analysis in state space (basic concepts of construability and observability)		

١٥	3		Review lecture		Oral presentation

13. Admissions	
Pre-requisites	**Level three should be finished – BME 411**
Minimum number of students	**10**
Maximum number of students	**40**

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1. Modern Control Engineering, By: Katsuhiko Ogata. (5th edition) 2. Control Systems Engineering, By: Norman S. Nise. (7th edition) 3. Modern Control Systems, By: Richard C. Dorf and Robert H. Bishop.(12th edition) 4. 4. Feedback Control Systems, By John Van De Vegte (3rd edition)
Special requirements (include for example workshops, periodicals, IT software, websites)	**Matlab software**
Community-based facilities (include for example, guest Lectures , internship , field studies)	