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	University of Baghdad / Alkhwarizmi College of Engineering
2. University Department/Centre	Biomedical Engineering Department
3. Course title/code	Medical Instrumentation and System II / BME546
4. Programme(s) to which it contributes	B.Sc. Biomedical Engineering
5. Modes of Attendance offered	Full Time
6. Semester/Year	2 Semesters
7. Number of hours tuition (total)	90 Hours
8. Date of production/revision of this specification	2021

9. Aims of the Course

This course aims at providing the student with the necessary basic and advanced concepts for the followings:

1. General Medical Instrumentation Block Diagram.
2. Physics of the MRI.
3. Physics of the CT.
4. Advanced Techniques and processing of Building the Data in Both CT and MRI.
5. Measurements and other useful tools in manipulating medical image in both CT and MRI.

10· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding

Graduates will be able to:

A1. Use their information and thoughtful of the appropriate modelling, scientific and computational tools that support medical instrumentation, to solve, in depth, analytical, design or theoretical problems in this field.

A2. Apply their data and understanding of physical and clinical laws, arithmetic analysis in order to model medical device and any other similar systems.

A3. Explain the role of Biomedical Engineers in medical instrumentation group of work and the constraints within which their clinical judgment will be exercised.

B. Subject-specific skills

B1. Discuss the principles and physics of MRI and CT systems.

B2. Discuss the design requirements and specifications, the preliminary stages of designs and their modified action and work, via series of videos and figures.

B3. Use the preliminary understanding to build a virtual explanation for the desired and undesired plan of design.

B4. Discuss the ability to explain new modification and the new trend of clinical supportive works.

Teaching and Learning Methods

The teaching and learning of such important Couse include the followings:

1. Lectures by the instructor himself explaining the main and important points of design.
2. Free discussion of the brain storm presented at the lecture times and discuss the new and future trends.
3. Seminars presented by the student and discussed directly by the other student and instructor.
4. Discussions of important points and induced ideas through social media.

Assessment methods

1. Seminar presented and discussed.
2. Site visited through group of students and under supervising of official medical company.
3. Home works and challenges of design thoughts.
4. Quizzes and exams.

C. Thinking Skills

C1. Apply appropriate analytical mathematics, scientific and engineering tools to the analysis of problems;
C2. Analyze and solve engineering problems;
C3. Design a medical device 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

• Internal lectures from manufacturers or clinicians;
• Feedback given to students during tutorials;
• 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 report(s).
• Group discussions of group work brainstorm case studies.
• Practical skills will be assessed through troubleshoot technique.
• 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 medical device 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.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3		Introduction to BMI		
2	3		MRI instrumentation and safety		
3	3		MRI signal		
4	3		MRI spatial encoding		
5	3		Quiz 1		Quiz
6	3		MRI image formation		
7	3		MRI sequences		
8	3		Quiz 2		Quiz
9	3		MRI image quality and formation		
10	3		MRI clinical I		
11	3		MRI clinical II		
12	3		Term Exam 1		
13	3		MRI Spectroscopy		
14	3		MRI new trends (3T)		
15	3		Quiz 3		
16	3		Basic Principles of CT		
17	3		Helical and Multislice CT I		
18	3		Helical and Multislice CT II		
19	3		Quiz 4		
20	3		Spatial resolution and Z sensitivity I		
21	3		Spatial resolution and Z sensitivity I		
22	3		Noise and Low Contrast Resolution I		
23	3		Noise and Low Contrast Resolution I		
24	3		Quiz 5		
25	3		Principles of CT Dosimetry		
26	3		CT image artifacts		
27	3		Quiz 6		
28	3		Medical Imaging system I		
29	3		Medical Imaging system II		
30	3		Term Exam		

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1. J. P. Hornak, “The Basics of MRI”, Online Book. 2. J. G. Webster, “Encyclopedia of Medical Devices and Instrumentation”, 2nd edition, John Wiley 2010. 3. J. D. Bronzino, “Biomedical Engineering Handbook, Medical Devices and Systems”, 3rd edition, Taylor and Francis Group, 2006.
Special requirements (include for example workshops, periodicals, IT software, websites)	Check the new modern websites talking about the new modifications
Community-based facilities (include for example, guest Lectures , internship , field studies)	

13. Admissions	
Pre-requisites	BME 445
Minimum number of students	20
Maximum number of students	30