Republic of Yemen
Minstry of Higher
Education &Sientific Research
21 september University – for Medical and Applied Science
Faculty of Medical Technology
Department of Biomedical Engineering Technology

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة 21 سبتمبر للعلوم الطبية والتطبيقية
كلية التكنلوجيا الطبية
قسم تكنولوجيا الهندسة الطبية

21 September University – for Medical and Applied Science

Biomedical Engineering Technology

Program Specifications

Preparation Committee:

1. Dr. Jamial Ahsan Mujalli
2. Dr. Awadh Ali Alkubati
3. Dr. Abdalruhman Mohemmed Obaid

1444 – 2022هـ

Department Head	Faculty Dean	Quality Unit	President

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1. Program Identification and General Information:		
1	**Scientific name of the program:**	Biomedical Engineering Technology
2	**Total credit hours required to award the degree**	**157** Credit Hours
3	**Number of years needed for completion of the program:**	4 Years [8 Academic semesters] + [1 semesters (Summer Training)]
4	**The body responsible for granting the degree:**	21 September University - for Medical and Applied Sciences
5	**The body responsible for the program:**	**Department** of Biomedical Engineering Technology **Faculty** of Medical Technology
6	**Award granted on completion of the program:**	**Bachelor of Science in** Biomedical Engineering Technology,
7	**Study system:**	Regular attendance (Semester based System)
8	**Study Language of the Program:**	English
9	**Entry requirements:**	Secondary School Certificate (Scientific)
10	**Departments participating in the program:**	Department of Biomedical Engineering Technology Department of Medical Information Technology Department of Medical Services Administration
11	**Starting year of the program:**	1445/1444 هـ – 2022/2023 م
12	**Study methods in the program:**	Full time
13	**Location of Delivery:**	21 September University - for medical and Applied Sciences campus
14	**The program resources:**	21 September University - for Medical and Applied Sciences
15	**Minimum grade requirements:**	Following the Admission Rules made by Ministry of Higher Education and Scientific Research- Republic of Yemen.
16	**Other admission requirements:**	21 Admission and Regulations Rules.
17	**Date of current development of the program:**	Aug 2022 – 1444 محرم
18	**Prepared by:**	1- Dr. Jamial Ahsan Mujalli 2- Dr. Awadh Ali Alkubati

		3- Dr. Abdalruhman Mohemmed Obaid
19	**Program coordinator:**	Dr. Awadh Ali Abdo Mohammed

2. Introduction:

The Bachelor's programme in biomedical engineering technology is designed with a unique and new scientific methodology to providing academic education to bachelor's students to enable them to graduate with knowledge, insight and experience to qualify them to working in any of the three areas: biomedical devices engineering and maintenance, medical applications and software development, and medical marketing and management. Thus preparing them for a future in which they continually work on their professional development and apply their expertise appropriately, effectively and with sound professional judgment.

The Bachelor's programme in Biomedical Engineering Technology focuses on the learning of an electrical engineering, medical electronics, medical devices maintenance, application programming and operating systems, marketing and management, and Entrepreneurship. Within this curriculum, students will learn to advance programming, marketing of medical devices and supplies, projects management, entrepreneurship, repair and maintain most of the standard types of medical equipment, using hand tools, power tools, measuring devices, and knowledge of manufacturers' manuals, troubleshooting techniques and carrying out maintenance schedules. Programme graduates are thus capable of working with advanced Biomedical engineering technology in an academically prudent, ethically sound and socially responsible way, and of contributing to the further development of the field of study. Furthermore, graduates are capable of pursuing a master's programme to specialize in a particular filed of biomedical engineering technology fields or aspect of the field and/or to gain further experience by conducting scientific researches.

Promising Jobs:

Graduates of this programme are classified as highly skilled engineering technologists who are high in demand in healthcare institutions, including hospitals, clinics and medical devices companys, research organizations, government agencies, Seles/Marketing, project manager and Entrepreneur. The main job specifications include programming, maintenance, troubleshooting, repairing of medical equipment's, managers and Entrepreneur. In general, biomedical engineering graduates can look at opportunities and jobs in the following sectors and industries:

1. Medical instrumentation specialist and engineer
2. specialist of Image and biosignal processing
3. Biomechanics and rehabilitation engineer
4. Bioinformatics and telemedicine engineer

5. Biomedical computing engineer
6. Field service engineer and representative
7. Entrepreneur, project or healthcare organization manager

3. University Vision, Mission, Values, Objectives, and Goals:

University vision:

A Contemporary University with National Responsibility and Faith Identity

University Mission:

Leadership of transformation headway in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.

University Core values:

- Leadership and Influence
- Work effectively with a time
- Excellence and Innovation

Special University Goals:

1- Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service.
2- Adopting student-cantered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work.
3- Attracting and Employing scientists, cadres and talents to gain minds and put an end for the "brain drain" in a way that promotes and ensures the availability of thinkers, businessmen and good citizens.
4- Developing the distinguished academic infrastructure continuously and establishing modern research and service centres with high efficiency that can give a real effect locally and regionally.
5- Enhancing the university status as a preferred partner for local, regional and

international partnership through implementing creative styles of education, exchanging researches and knowledge, and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.

4. Faculty Vision, Mission, Values, and Objectives:

Faculty Vision:

A contemporary medical technology faculty with sober academic dimensions, national responsibility and faith identity.

Faculty Mission:

Participation in leading the medical technological transformation to provide technically and informatically integrated health care, through the provision of scientific educational programs with solid and contemporary academic dimensions, and research services of a creative nature that meet the needs of the Yemeni health sector, its specificity and regional needs.

Faculty Values:

- Forefronting
- Pioneering
- Sobriety

Faculty Goals:

1- Applying Total Quality Standards, and setting an academic excellence in medical technology sciences, scientific research and community service.
2- Centrality of students in the educational process, their participation, as well as, looking after them, establishing originality values and developing their potential after graduation and during work.
3- Attracting highly scholars cadres, and highly specialized talents in medical technology thus enhances and ensures that there are thinkers, businessmen, and good citizens.
4- Harnessing all available capabilities of infrastructure, academic, training centers, as well as, modern researches and service centers and available educational laboratories to achieve the desired goals of the college of medical technology in order to meet the needs of the labor market.
5- Enhance the university and college position as an ideal partner for the academic and health

sectors at the local, regional and international levels by providing educational programs for developing professional practices and useful health-care services.

5. Department Vision, Mission, and Objectives:

Department Vision:

The fore in providing contemporary educational programs and sober academic research's in the field of biomedical engineering technology.

Department Mission:

Fore in providing contemporary educational programs in biomedical engineering technology to prepare biomedical engineers and academic cadres who are qualified intellectually and professionally, in order to meet the needs of the health sector locally and regionally, through a sober educational and research environment that catalyzes produce creative researches, to serving the local and regional community.

Department Objectives:

1- To provide distinguished and excellent academic programs in field of biomedical engineering technology.

2- To encourage creative and innovative thinking to identify and solve the medical engineering problems to serve the needs of health-care organization.

3- To implement acquired knowledge of biomedical technology in efficient and effective manner to construct biomedical engineering solution to solve health problem in dynamic environment.

4- To acquire skills to communicate and work effectively as an individual or as member in team and follow appropriate biomedical engineering practices with professional, societal, legal, and ethical responsibility.

5- To pursue lifelong learning, career development and provide foundation for research and further studies.

6. Biomedical Engineering Technology Program Mission and Objectives:

Program Mission:

Preparing sober engineers in medical technology engineering who are qualified intellectually and professionally and able to acquire and apply knowledge in developing and maintenance of biomedical technology and contemporary with current developments in the field of medical technology, in order to meet the needs of the health sector locally and regionally, through a sober educational and research environment that catalyzes to produce creative researches, to serving the local and regional community.

Program Educational Objectives:

PEO1. Providing a distinguished education in field of biomedical engineering technology.

PEO2. Providing an educational environment for students to apply theory with practice oriented laboratory, industrial, or clinical experiences.

PEO3. Graduating leaders who can communicate well at all levels within an organization.

PEO4. Preparing an engineers who can work well either independently or in a team.

PEO5. Encouraging a culture of scientific research by providing the necessary research facilities.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the University and Faculty.

7. Program Standards & Benchmarks:

Academic Standards:

1. National Academic Reference Standards (NARS) For Undergraduate Engineering Programs, Yemen, First Edition, Council for Accreditation & Quality Assurance, Yemen, May 2018.
2. Criteria for Accrediting Engineering Programs, (Bioengineering, Biomedical Engineering), 2019-2020, Accreditation Bureau for Engineering and Technology (ABET).

Governmental Rules and Regulations:

1. Act No. 13/2005 of the Law of private universities, higher institutes and colleges, Yemen.
2. The executive regulations of Act No. 13/2005 of the Law of private universities, higher institutes and colleges, Yemen.
3. 21 September University - for Medical and Applied Sciences .

Annex- 2, Academic Standards Curriculum Criteria of Accreditation Board

Annex- 3, Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research

Program Benchmarks:

1. King Saud University, B.Sc. (Bachelor of Science in Biomedical Technology), College of applied medical sciences , Department of Biomedical Technology - Instruments , KSA https://cams.ksu.edu.sa/en/departments/biomedical-technololgy
2. Majmaah University, B.Sc.(Biomedical Equipment Technology), College of Applied Medical Sciences, Department of Medical Equipment Technology, KSA. https://m.mu.edu.sa/en/colleges/college-of-applied-medical-sciences/173196
3. National University of Singapore, B.Sc.(Bachelor of Biomedical Engineering) , College of Engineering , Department of Biomedical Engineering, Singapore. https://www.eng.nus.edu.sg/bme/undergraduate/degree-programmes/beng-bme/modules/
4. The University of Hong Kong, B.Sc.(Biomedical Engineering), Faculty of Engineering, Department of Biomedical Engineering, China. https://www.engineering.hku.hk/bmeengg/
5. East Tennessee State University , B.Sc.(Biomedical Engineering Technology), College of Business and Technology, Department of Engineering Technology, Surveying, and Digital Media , United States. https://www.etsu.edu/cbat/applieddesign/biomed.php
6. Eastern Mediterranean University. B.Sc (Biomedical Engineering Technology) college of Computing and Technology, , Department of Biomedical Equipment Technology, Turkey. https://www.emu.edu.tr/en/programs/biomedical-equipment-technology-associate-program-turkish/784

8. Graduate Attributes:

After successfully completing the program, the graduate should be able to:

1. Demonstrate knowledge of biomedical engineering technology discipline theoretically and practically.
2. Identify biomedical engineering technology problems and biomedical devices maintenance requirements using engineering approaches, tools and techniques.
3. Analyze, design and manage biomedical engineering solutions within the context of biomedical engineering technology discipline to meet the organization's goals and health objectives.
4. Work effectively within a team or individually in maintenance procedures, troubleshooting, and managing practices and engineering trends of biomedical engineering technology.
5. Use efficiently engineering tools, research capability, maintenance capability, leadership, communication, interpersonal relationship and life-long learning skills.
6. Demonstrate commitment to ethical, legal and social responsibilities as professionals in biomedical engineering technology.

9. Program Intended Learning Outcomes (PILOs):

A. Knowledge and Understanding:

Upon successful completion of the Program, the graduates will be able to:

A1. Explain the appropriate models, theories, mathematical foundations, and techniques related to biomedical engineering technology context.

A2. Clarify the biomedical devices maintenance principles and how these are important for solving biomedical devices and equipment's problems in health environment.

A3. Recognize the user and healthcare needs to provide based solutions on a high level of management, professional and ethical behavior, responsibility, standards, health and safety requirements in biomedical systems to real-healthcare problem.

A4. Understand an examples of a biomedical engineering technology concept and methods related to maintenance, measurement techniques, programming, creative engineering solutions, analytical skills, applied to healthcare quality and problems of medical devices issues.

B. Cognitive/ Intellectual Skills:

Upon successful completion of the Program, the graduates will be able to:

B1. Use the basic science, mathematical theories, engineering principles to analyze the problems of devices and/or processes relevant to biomedical engineering fields.

B2. Analyze the impacts of problems related to the Biomedical equipments and its solution principles in a creative manner by using a systematic and analytical thinking methods.

B3. Assess the features of biomedical devices systems, engineering diagnostic skills, technological expertise, and analytical methods that related to identify and addressing of biomedical devices

systems failures.

B4. Apply the principles of biomedical devices maintenance and its various methods to work professionally in biomedical engineering field.

C. Practical and Professional Skills:

Upon successful completion of the Program, the graduates will be able to:

C1. Relate integrally knowledge of life science, biomedical engineering technology practice concepts, principles of engineering and techniques evaluation to solve problems relevant to biomedical engineering.

C2. Evaluate an engineering technique, modern analytical tools and required computer programs to analyzing and solve the problems of medical devices.

C3. Develop an engineering approach, engineering equipment, instruments to maintenance and conduct experiments, and present results in the biomedical engineering practice.

C4. Comply the basic skills in use of techniques, apply quality assurance procedures, and follow safety standards in maintenance procedures.

D. General and Transferable Skills:

Upon successful completion of the Program, the graduates will be able to:

D1. Function effectively as an individual, team member, or leader in activities relevant to biomedical engineering, and collaborating to achieve a shared objective.

D2. Acquire entrepreneurial skills and effectively manage tasks, time, processes and resources.

D3. Exhibit strong IT skills and communicate clearly, both verbally and in written technical reports.

D4. Pursue ongoing professional development and lifelong learning in the biomedical engineering filed.

Annex- 4, Survey of Similar Accredited Programs at National and International Universities (Benchmarks)
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Annex- 12, Survey of PILOs for Similar Accredited Programs at National and International Universities.

10. Teaching and Learning Strategies:

Knowledge and Understanding Skills is developed through:

- Lectures
- Tutorials
- Discussion
- Presentation
- Self-learning
- Case Study (CBL)

Intellectual Skills are developed through:

- Lectures
- Tutorials
- Discussion
- Case studies (CBL)
- Self-Learning
- Problem Based Learning (PBL)

Practical and professional Skills are developed through:

- Tutorials
- Training
- Case studies (CBL)
- Problem Solving Learning (PSL)
- Problem Based Learning (PBL)

General/Transferrable Skills are developed through:

- Discussion
- Case studies (CBL)
- Self-Learning
- Presentation

Teaching Strategy	Description
Active lectures	The lectures are conducted in the class. It are provided on a weekly basis. It also showing students what they need to know, the teacher incorporates a variety of formats including lectures and multimedia presentations.
Problem solving	This allows students to become more active in their learning as they work out which devices maintenance information they need to find out how to solve a particular problem.
Tutorials	Some courses need to have tutorial sessions to solve problems related to the subjects. The students exchange their knowledge with the teacher.
Seminar/ Project/Presentation	Assigned project is given to student and she/he must give a seminar to present her/his project.
Teamwork	The students are assigned to work in a small group as a team on some subjects.
Laboratory based session	Laboratory based sessions are required for some courses to balance between theoretical and practical issues.
Interactive Class	Interactive class discussions are carried out about some aspects, related to the

Teaching Strategy	Description
Discussions	subject. It involves a large or small group activity that encourages students to focus on a topic and contribute to the free flow of ideas. The teacher may begin a brainstorming session by posing a question or a problem, or by introducing a topic. Students then express possible answers, relevant words and ideas.
Directed Self- Study	The student should be directed to some related references to read and summarize some.
Exercises and Home Works	Exercises and home works are assigned to students periodically, so the students will gain more knowledge about the subjects.
Field Visits	The students are assigned to perform a site visit to acquire field related devices, equipment's and maintenance services.

11. Assessment Methods:

Knowledge and Understanding Skills is developed through:

- Written Exams
- Final practical exam
- Assignments

Intellectual Skills are developed through:

- Written Exams
- Final practical exam
- Assignments

Practical and professional Skills are developed through:

- Written Exams
- Final practical exam
- Assignments

General/Transferrable Skills are developed through:

- Assignments

Assessment Strategy	Description
Written exams (Midterm and final exams)	Midterm & Final exams for each course is required for all courses except Graduation Projects. These exams will evaluate the extent in which the student understanding of theoretical and applied subjects
Case studies	Assigning case studies to students is very helpful to assess the extent of understanding the topics.
Presentations	It's an assessment of the ability of organizing and the way of presentation.
Project/ Practical Lab/ Reports	Assessing students to their ability to write theoretical and lab reports as well as the understanding of organizing the reports. The practical lab sessions are required for some courses.
Coursework Activities	Coursework Activities is one of the assessment methods by which it can evaluate students.
Homework's	Home works and assignments will evaluate students according to their ability to

Assessment Strategy	Description
	explain and illustrate the assignments they are given.
Written assignments such as multiple choice questions, quizzes or drawings	Some points are assigned to multiple choice questions and Quizzes in order to asses' student ability to follow the lecturer during the study course.

12. Alignment of Program Intended Learning Outcomes (PILOs) to Teaching Strategies and Assessment Methods:

PILOs	Teaching Strategy	Assessment Methods
Knowledge and Understanding	Lectures, Interactive class discussions, Tutorials.	Written exams, assignment work, quizzes, submission of reports.
Intellectual Skills	Lectures, Tutorial, Interactive class discussions, and group work, presentation.	Written exams, Project, Case studies and assignment work.
Professional & practical skills	Short lectures, case study, Laboratory experiments, Project, and group work, Field training, Drawing sessions.	Written exams, quizzes, Practical exam assignment and report submission.
General & Transferable Skills	Group work, Self-study, Interactive class discussions, Tutorials, Seminar/ project/presentation, Laboratory experiments, Project, and Art Gallery	Project presentation, Laboratory exam, Report/Project

13. Project Assessment:

Each project will be assessed by a committee of three members as follows:

Item	Marks Distribution
Project supervisor.	50%
Internal examiner: a member of the department staff.	25%
External or faculty examiner: a qualified external examiner from other departments of the faculty or from another university.	25%
Total	**100%**

14. Training Course Assessment:

Six (6) months training period in an approved and related engineering institution: governmental, commercial, or industrial. This internship provides real-life experience and exposure and provides the students with real opportunity to get connected and develop their professional network and connection.

The training course will be assessed through:

- Evaluation by the program chair during at least two field visits (30%)
- Evaluation by the external supervisor from the field (30%)
- Reports presented by students groups related to different training branches (40%).

15. Intended Learning Outcomes Mapping:

See below Annexes.

Annex- 13, Alignment of Program PILOs with Council of Accreditation and ABET Standards
Annex- 14, Survey of Credit Hours of Similar Programs

16. Program Structure:

No	Requirements		No. of Courses	Credit Hours	Rational Weight %
1	University Requirements	Compulsory	7	14	9%
		Elective	--	--	
2	Faculty Requirements	Compulsory	10	21	13%
		Elective	--	--	
3	Department Requirements	Compulsory	10	29	18%
		Elective	--	--	
4	Program Requirements	Compulsory	31	81	55%
		Elective	2	6	
5	Field Training	Compulsory	1	6	4%
		Elective	--	--	
Total:			61	157	100%

* The Project Courses Credit Hours are already added to the total credit hours with the program requirements.

16.1. University Requirements

Compulsory Courses

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1.	Level 1/ semester 1	06.11.701	English 101	لغة انجليزية 101	2	2			
2.	Level 1/ semester 1	06.11.702	Arabic 101	لغة عربية 101	2	2			
3.	Level 1/ semester 1	06.11.703	Islamic Culture	ثقافة إسلامية	2	2			
4.	Level 1/ semester 1	06.11.704	National Culture	ثقافة وطنية	2	2			
5.	Level 1/ semester 2	06.11.705	English 102	لغة انجليزية 102	2	2			
6.	Level 1/ semester 2	06.11.706	Arabic 102	لغة عربية 102	2	2			
7.	Level 1/ semester 2	06.11.707	Arabic Israeli Conflict	الصراع العربي الإسرائيلي	2	2			
Total					14	14	0	0	

Elective Courses: None

16.2. Faculty Requirements

Compulsory Courses

No.	Level/Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1	Level 1/ semester 1	04.01.711	Fundamentals of Nursing	اساسيات التمريض	3	2	-	2	
2	Level 1/ semester 1	04.02.712	Medical Terminology	مصطلحات طبية	2	2	-	-	
3	Level 1/ semester 2	05.01.713	Principle of Health Management	مبادئ الادارة الصحية	2	2	-	-	
4	Level 1/ semester 2	01.01.714	Anatomy and Physiology	علم التشريح ووظائف الأعضاء	2	2	-	-	
5	Level 1/ semester 2	05.01.715	Communication skills and Presentation	مهارات الاتصال والتواصل	2	2	-	-	
6	Level 1/ semester 2	03.01.716	General Biology	أحياء عامة	2	2	-	-	
7	Level 2/ semester 2	03.01.717	General and Biochemistry	الكيمياء العامة والحيوية	3	2	-	2	
8	Level 3/ semester 1	05.01.718	Total Quality Management	إدارة الجودة الشاملة	2	2	-	-	
9	Level 3/ semester 1	05.02.719	Biostatistics	الإحصاء الطبي الحيوي	3	2	-	-	
10	Level 3/ semester 2	05.02.720	Research methodology	أساليب البحث العلمي	2	2	-	-	
Total					**20**	**20**	**0**	**4**	

Elective Courses: None

16.3. Department Requirements

Compulsory Courses

No.	Level/Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1	Level 1/ semester 1	07.02.701	Math 1	رياضيات 1	3	2	2	-	
2	Level 1/ semester 1	07.02.703	Biophysics	فيزياء طبية	3	2	2	-	
3	Level 1/ semester 1	07.01.701	Introduction to Information Technology	مقدمة إلى تكنولوجيا المعلومات	3	2	-	2	
4	Level 1/ semester 2	07.02.704	Math 2	رياضيات 2	3	2	2	-	
5	Level 1/ semester 2	07.01.702	Programming 1	برمجة 1	3	2	-	2	
6	Level 2/ semester 1	07.02.705	Fundamental of Electrical Circuits	اساسيات الدوائر الكهربائية	3	2	-	2	
7	Level 2/ semester 1	07.01.706	System Analysis and Design	تحليل وتصميم نظم	3	2	-	2	
8	Level 2/ semester 1	07.01.703	Programming 2	برمجة 2	3	2	-	2	
9	Level 2/ semester 1	07.02.706	Math 3	رياضيات 3	3	2	2	-	
10	Level 2/ semester 1	07.02.707	Digital Logic Design	التصميم المنطقي الرقمي	3	2	-	2	
11	Level 2/ semester 2	07.01.707	Computer Network	شبكات الحاسوب	3	2	-	2	
12	Level 2/ semester 2	07.01.709	Object-Oriented Programming	برمجة هدفية موجهة	3	2	-	2	
13	Level 3/ semester 1	07.02.716	Biomedical Devices 1	أجهزة طبية 1	3	2	-	2	
14	Level 3/ semester 1	07.01.713	Visual Programming	برمجة مرئية	3	2	-	2	
15	Level 4/ semester 1	07.01.725	Project 1	مشروع تخرج 1	3	3	-	-	
16	Level 4/ semester 2	07.01.726	Project 2	مشروع تخرج 2	3	3	-	-	
17	Level 4/ semester 2	07.01.729	Entrepreneurship	ريادة أعمال	2	2	-	-	
Total					**50**	**36**	**8**	**18**	

Elective Courses: None

16.4 Major Requirements

Compulsory Courses

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	L	T	P	Cr. Hrs.	Prerequisites, Co-requisites
1	Level 1/ semester 1	07.02.702	Introduction to Biomedical Engineering Technology	مقدمة الى تكنولوجيا الهندسة الطبية	2	-	-	2	
2	Level 2/ semester 1	07.02.708	Statics and Dynamics	استاتيكا وديناميكا	2	-	-	2	
3	Level 2/ semester 1	07.02.709	Engineering Drawing	الرسم الهندسي	2	2	-	3	
4	Level 2/ semester 1	07.02.710	Biomedical Measurements and Instrumentations	القياسات وأجهزة القياس الطبية	2	-	2	3	
5	Level 2/ semester 2	07.02.711	Advance Electrical Circuits	دوائر كهربائية متقدمة	2	-	2	3	
6	Level 2/ semester 2	07.02.712	Electronics 1	الكترونيات 1	2	-	2	3	
7	Level 2/ semester 2	07.02.713	Optical & Laboratory Medical Equipment's	أجهزة البصريات والمختبرات الطبية	2	-	2	3	
8	Level 2/ semester 2	07.02.714	Biomechanics	ميكانيكا حيوية	2	-	-	2	
9	Level 3/ semester 1	07.02.715	Biomaterials	المواد الحيوية	2	-	-	2	
10	Level 3/ semester 1	07.02.717	Electronics 2	الكترونيات 2	2	-	2	3	
11	Level 3/ semester 1	07.02.718	Clinical Engineering	هندسة سريرية	2	2	-	3	
12	Level 3/ semester 2	07.02.719	Medical Image Processing	معالجة الصور الطبية	2	-	2	3	
13	Level 3/ semester 2	07.02.720	Biomedical Devices 2	أجهزة طبية 2	2	-	2	3	
14	Level 3/ semester 2	07.02.721	Biomedical signals processing	معالجة الإشارات الحيوية	2	-	2	3	
15	Level 3/ semester 2	07.02.722	Microcontroller and Microprocessor	معالجات ومتحكمات دقيقة	2	-	2	3	
16	Level 3/ semester 2	07.02.723	Artificial Organs and Extremities	أعضاء وأطراف صناعية	2	-	-	2	
17	Level 3/ semester 2	07.02.724	Principles of Marketing for medical devices	مبادئ التسويق للأجهزة والمستلزمات الطبية	2	-	-	2	

			and supplies						
18	Level 3/ semester 2	07.02.725	Bioelectronics	الكترونيات طبية	2	-	2	3	
19	Level 4/ semester 1	07.02.726	current issues in biomedical engineering	القضايا الراهنة في الهندسة الطبية الحيوية	3	-	-	2	
20	Level 4/ semester 1	07.02.727	Biomedical Devices Maintenance 1	صيانة الأجهزة الطبية 1	2	-	2	3	
21	Level 4/ semester 1	07.02.728	Safety in Biomedical Engineers	السلامة المهنية في الهندسة الطبية	2	-	-	2	
22	Level 4/ semester 1	07.02.730	Rehabilitation Procedures	إجراءات إعادة التأهيل	2	-	-	2	
23	Level 4/ semester 2	07.02.731	Biomedical Devices Maintenance 2	صيانة الأجهزة الطبية 2	2	-	2	3	
24	Level 4/ semester 2	07.02.732	Occupational Ethics For Biomedical Engineers	اخلاقيات المهنة لمختصي الهندسة الطبية	2	-	-	2	
25	Level 4/ semester 1	07.02.729	Elective 1	اختياري 1	3	-	-	3	
26	Level 4/ semester 2	07.02.733	Elective 2	اختياري 2	3	-	-	3	
Total					**55**	**4**	**24**	**68**	

Elective Courses									
No	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
27			Elective 1 - Artificial Intelligent	الذكاء الاصطناعي	3			3	
28			Elective 1 - Robotics Principles and Applications in BME	مبادئ الروبوتات وتطبيقاتها في الهندسة الطبية	3			3	
29			Elective 1 - Current Issus in Biomedical Engineering	القضايا الراهنة في الهندسة الطبية الحيوية	3			3	
30			Elective 2 - Rehabilitation Procedures	إجراءات إعادة التأهيل	3			3	

31			Elective 2 - Rehabilitation Procedures	تعليم الآلة	3			3	
Total					**6**			**6**	

Project Work Courses

No	Level-Sem.	Course Code	Course Name	اسم المقرر	L	T	P	**Cr. Hrs.**	Prerequisites, Co-requisites
1			Final Project 1	مشروع تخرج 1	2			2	07.02.730, 07.02.736, 07.01.749
2			Final Project 2	مشروع تخرج 2	2		2	3	07.02.737, 07.01.748, 07.01.753
Total					4		2	5	

Field Attachments and Training Courses

No	Level-Sem.	Course Code	Course Name	اسم المقرر	L	T	P	**Cr. Hrs.**	Prerequisites, Co-requisites
1			Field Training	تدريب ميداني				6	07.02.737, 07.02.738, 07.02.741
Total								6	

16.4 Study Plan:

Level 1

Term 1								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	06.11.703	English 101	لغة انجليزية 101	2			2	
2	06.11.701	Arabic 101	لغة عربية 101	2			2	
3	06.11.705	Islamic Culture	ثقافة إسلامية	2			2	
4	06.11.706	National Culture	ثقافة وطنية	2			2	
5	04.01.701	Fundamentals of Nursing	اساسيات التمريض	2			2	
6	04.02.702	Medical Terminology	مصطلحات طبية	2			2	
7	07.02.711	Math 1	رياضيات 1	2		2	3	
8	07.02.724	Introduction to Biomedical Engineering Technology	مقدمة الى تكنولوجيا الأجهزة الطبية	2			2	
9	03.01.707	Biophysics	فيزياء طبية	2		2	3	
10	07.01.701	Introduction to Information Technology	مقدمة الى تكنولوجيا المعلومات الطبية	2		2	**3**	
Total				**20**	**0**	**6**	**23**	

Term 2								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	06.11.704	English 102	لغة انجليزية 102	2			2	
2	06.11.702	Arabic 102	لغة عربية 102	2			2	
3	06.11.707	Arabic Israeli Conflict	الصراع العربي الإسرائيلي	2			2	
4	05.01.703	Principle of Health Management	مبادئ الادارة الصحية	2			2	
5	01.01.704	Anatomy and Physiology	علم التشريح ووظائف الأعضاء	2			2	
6	05.01.705	Communication skills and Presentation	مهارات الاتصال والتواصل	2			2	
7	07.02.712	Math 2	رياضيات 2	2		2	3	
8	07.02.714	General Biology	احياء عامة	2		2	3	
9	07.01.744	Programming 1	برمجة 1	2		2	3	
Total				**18**	**0**	**6**	**21**	

Level 2

Term 1								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	07.02.718	Electrical Circuits 1	دوائر كهربائية 1	2		2	3	
2	05.02.706	System Analysis and Design	تحليل وتصميم النظم	3			3	
3	07.01.745	Programming 2	برمجة 2	2		2	3	
4	07.02.713	Math 3	رياضيات 3	2		2	3	
5	07.02.720	Digital Logic Design	التصميم المنطقي الرقمي	2		2	3	
6	07.02.716	Statics and Dynamics	استاتيكا وديناميكا	2			2	
7	07.02.715	Engineering Drawing	رسم هندسي	1		2	2	
8	07.01.747	Biomedical Measurements and Instrumentations	قياسات وأجهزة القياس الطبية	2		2	3	
Total				**16**	**0**	**10**	**22**	

Term 2								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	07.02.719	Electrical Circuits 2	دوائر كهربائية 2	2		2	3	
2	07.02.725	Computer Network	شبكات	2		2	3	
3	07.01.746	Object-Oriented Programming	برمجة هدفية موجهة	2		2	3	
4	05.01.708	Biomedical Electronics 1	الكترونيات طبية 1	2		2	3	
5	07.02.726	Optical & Laboratory Medical Equipment's	اجهزة البصريات والمختبرات الطبية	2		2	3	
6	07.01.748	Operating System	نظم التشغيل	3			3	
7	07.01.751	Software Engineering	هندسة برمجيات	3			3	
Total				**16**	**0**	**10**	**21**	

Level 3

Term 1								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	07.02.721	Biomechanics	ميكانيكا حيوية	2		2	3	
2	05.01.709	Total Quality Management	إدارة الجودة الشاملة	2			2	
3	07.02.729	Biomedical Devices 1	أجهزة طبية 1	2		2	3	
4	07.01.750	Biostatistics	الإحصاء الطبي الحيوي	2			2	
5	07.01.749	Visual Programming	برمجة مرئية	2		2	3	
6	07.02.727	Biomedical Electronics 2	الكترونيات طبية 2	2		2	3	
7	07.02.728	Clinical Engineering	هندسة اكلينيكية	2			2	
Total				**14**	**0**	**8**	**18**	

Term 2								
No	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	07.02.722	Biomaterials	المواد الحيوية	2			2	
2	07.02.730	Biomedical Devices 2	أجهزة طبية 2	2		2	3	
3	07.02.732	Biomedical signals processing	معالجة الإشارات الطبية الحيوية	2		2	3	
4	07.02.723	Microcontroller and Microprocessor	معالجات ومتحكمات دقيقة	2		2	3	
5	07.02.733	Artificial Organs and Extremities	اعضاء وأطراف صناعية	2			2	
6	07.02.735	Principles of Marketing for medical devices and supplies	مبادئ التسويق للأجهزة والمستلزمات الطبية	2			2	
7	05.02.710	Research methodology	اساليب البحث العلمي	2			2	
Total				**14**	**0**	**6**	**17**	

Level 4

Term 1								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	07.01.752	Mobile Application Development	تطوير تطبيقات الأجهزة المتنقلة	2		2	3	
2	07.02.736	Biomedical Devices Maintenance 1	صيانة الأجهزة والمعدات الطبية 1	2		2	3	
3	07.02.731	Safety for Biomedical Engineers	السلامة المهينة للمهندس الطبي	2			2	
4	07.01.752	Elective 1	اختياري 1	3			3	
5	07.02.734	Rehabilitation Procedures	إجراءات إعادة التأهيل	2			2	
6	07.02.740	Project 1	مشروع تخرج 1	3			3	
Total				**14**	**0**	**4**	**16**	

Term 2								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	07.02.741	Project 2	مشروع تخرج 2	3			3	
2	07.02.737	Biomedical Devices Maintenance 2	صيانة الأجهزة والمعدات الطبية 2	2		2	3	
3	07.02.739	Occupational Ethics For Biomedical Engineers	اخلاقيات المهنة لمختصي الهندسة الطبية	2			2	
4	07.01.753	Elective 2	اختياري 2	3			3	
5	05.01.753	Entrepreneurship	ريادة أعمال	2			2	
Total				**12**	**0**	**2**	**13**	

Term 2								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	07.02.742	Field Training	تدريب ميداني				6	07.02.737
Total							**6**	

Elective Courses								
No.	**Course Code**	**Course Name**	**اسم المقرر**	**L**	**T**	**P**	**Cr. Hrs.**	**Prerequisites, Co-requisites**
1	07.02.740	Elective 1 - Artificial Intelligent	ذكاء اصطناعي	3			3	
2	07.02.740	Elective 1 - Analog Control System	أنظمة تحكم تناظرية	3			3	
3	07.02.741	Elective 2 - Digital Control System	أنظمة تحكم رقمية	3			3	
4	07.02.741	Elective 2 - Machine Learning	تعليم الآلة	3			3	
Total				**6**			**6**	

16.5 Distribution of Total Credit Hours:

Level	Term	University Requirements		Faculty Requirements		Department Requirements		Major Requirements		Elective Courses		Training		Project		Total Cr. Hrs.		Total Cr. Hrs./ Level
		No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	
First	First	4	8	2	4	1	3	2	5	-	-	-	-	-	-	9	20	27%
	Second	3	6	3	6	1	3	2	5	-	-	-	-	-	-	9	20	
Second	First	-	-	2	5	2	4	4	11	-	-	-	-	-	-	8	20	26%
	Second	-	-	1	2	2	4	5	13	-	-	-	-	-	-	8	19	
Third	First	-	-	1	2	2	5	4	10	-	-	-	-	-	-	7	17	24%
	Second	-	-	1	2	-	-	6	17	-	-	-	-	-	-	7	19	
Fourth	First	-	-	--	-	2	5	3	7	-	-	-	-	-	-	5	12	23%
	Second	-	-	1	2	1	2	3	7	-	-	1	6	2	5	8	22	
Total:		7	14	11	23	11	26	29	75	0	0	1	6	2	5	61	149	100%
Percentage:		11%	9%	18%	15%	18%	17%	48%	50%	-	-	2%	4%	3%	3%	100%	100%	

Annex- 15, Survey of Number of Courses and Credit Hours of Similar Programs

Annex- 16, Themes of Courses of Study and their Weightage

Annex- 17, Coding System

Annex- 18, Survey of Course Names per Academic Semesters of Similar Program

Annex- 19, Comparison of Program Courses and Similar Programs Courses

Annex- 20, Matrix of Mapping Program PILO's with Courses

16.6 Admission Requirements:

1. Admissions to the program shall be made as per the admission rules set by the Ministry of Higher Education and Scientific Research as well as 21 September university for medical and Applied Sciences admission guidelines.
2. General Secondary school certificate (Science Section) or any equivalent certificate with grade as specified in the admission rules made by Ministry of Higher Education and Scientific Research.
3. Pass the aptitude test and personal interview if any.
4. Any necessary requirement for specialization, decided by the faculty.

16.7 Attendance and Graduation Requirements:

1. Student attendance should not be less than 75%.
2. Student will graduate after successfully passing all program requirements.
3. Total credit hours for the program are **157** credit hours**.**
4. Minimum score for any student to pass any credit hours course is 50% marks.

16.8 Grading System:

From 90% to 100% of total marks	Excellent
From 80% to less than 89%	Very Good
From 65% to less than 79%	Good
From 50% to less than 64%	Pass
Less than 50%	Poor/Fail

16.9 Facilities Required for Running the Program:

1. Sufficient Classrooms furnished with all necessary pieces and equipment.
2. Drawing halls.
3. Labs .. as per the courses specifications
4. Computer Labs.
5. Academic and administrative staff offices.

16.10 Program Assessment:

	Type of the Sample who Assess the program	Instruments used	Sample
1	**Graduates**	**Questionnaire**	20%
2	**Academic Staff**	**Interviews**	100%
3	**Employment agencies (views)**	**Questionnaires**	50%
4	**Final year students**	**Focus group discussions**	20%
5	**External Examiners**	**Interviews**	100%
6	**Others CAQA**	**Interviews/ Documents analysis**	100%

16.11 Program Quality Standards:

16.12 Internal and external training to satisfy program standards:

16.13 Program Policies:

Based on University Regulations

1.	**(Class Attendance):** A student should attend not less than 75 % of total hours of the subject; otherwise, he/she will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic. If the absent is more than 25% of a course total contact hour, student will be required to retake the entire course again.
2.	**(Tardy) :** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent.
3.	**(Exam Attendance/Punctuality) :** A student should attend the exam on time. He/she is permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4.	**(Assignments & Projects) :** Assignments and projects are given as per course specification; the student has to submit all the assignments for checking on time, mostly one week after given the assignment.
5.	**(Cheating) :** For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6.	**(Plagiarism) :** Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he/she will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university or according to the university roles.
7.	**(Other policies) :** - Mobile phones are not allowed to use during a class lecture. It must be closed; otherwise the student will be asked to leave the lecture room. - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments might be given directly to students using soft or hard copy.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the University and Faculty:

Benchmarked Programs:

1. King Saud University, B.Sc. (Bachelor of Science in Biomedical Technology), College of applied medical sciences , Department of Biomedical Technology - Instruments , KSA

https://cams.ksu.edu.sa/en/departments/biomedical-technololgy

2. Majmaah University, B.Sc.(Biomedical Equipment Technology), College of Applied Medical Sciences, Department of Medical Equipment Technology, KSA.

https://m.mu.edu.sa/en/colleges/college-of-applied-medical-sciences/173196

3. National University of Singapore, B.Sc.(Bachelor of Biomedical Engineering) , College of Engineering , Department of Biomedical Engineering, Singapore.

https://www.eng.nus.edu.sg/bme/undergraduate/degree-programmes/beng-bme/modules/

4. The University of Hong Kong, B.Sc.(Biomedical Engineering), Faculty of Engineering, Department of Biomedical Engineering, China.

https://www.engineering.hku.hk/bmeengg/

5. East Tennessee State University , B.Sc.(Biomedical Engineering Technology), College of Business and Technology, Department of Engineering Technology, Surveying, and Digital Media , United States.

https://www.etsu.edu/cbat/applieddesign/biomed.php

6. Eastern Mediterranean University. B.Sc (Biomedical Engineering Technology) college of Computing and Technology, , Department of Biomedical Equipment Technology, Turkey.

https://www.emu.edu.tr/en/programs/biomedical-equipment-technology-associate-program-turkish/784

1- Vision of the Corresponding Departments and Suggested Vision:

#	The Department	Vision
1.	**Department of Biomedical Technology, College of applied medical sciences, King Saud University**	Pioneering and Excellence in preparing competent professional in the field of Biomedical Equipment Technology.
2.	**Department of Medical Equipment Technology, College of Applied Medical Sciences, Majmaah University**	The department vision is compatible with the Saudi Arabian missions, where it's focused on the creativity and innovation in teaching medical devices technology to establish local and national partnership and to contribute to scientific research internationally.
3.	**Department of Biomedical Engineering, Faculty of Engineering, National University of Singapore**	A leading biomedical engineering department advancing knowledge and nurturing talent.
4.	**Department of Biomedical Engineering, Faculty of Engineering, University of Hong Kong**	To train a new generation of biomedical engineers who can apply quantitative engineering analysis to understand the working principle of living systems, and design novel solutions to address unmet needs in biomedicine, especially for healthy ageing.
5.	**Department of Engineering Technology, Surveying, and Digital Media, Faculty of Business and Technology, East Tennessee State University**	Developing a knowledge of modern electronics and biomedical instrumentation.
6.	**Department of Biomedical Equipment Technology, School of Computing and Technology, Eastern Mediterranean University**	To create world-class graduates to meet the 21st century needs of biomedical-related industries focused on patient care via medical devices and pharmaceuticals, as well as government and private consulting practice – all founded on a strong science and engineering education.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientation of the University and Faculty:

2- Mapping of Department Vision to the University and Faculty Visions:

University Vision	Faculty of Medical Technology Vision	Department of Biomedical Engineering Technology Vision
A Contemporary University with National Responsibility and Faith Identity. جامعة معاصرة بمسؤولية وطنية وذات هوية ايمانية	Distinction regionally in education and scientific research in medical technology.	To maintain regionally leading and recognized reputation in the field of biomedical engineering technology by providing distinguished academic programs, quality education and research environment.

3- Mission of the Corresponding Departments and Suggested Mission:

#	The Department	Mission
1.	**Department of Biomedical Technology, College of applied medical sciences, King Saud University**	Preparing highly competent graduates in the field of Biomedical Equipment Technology to support the health care sector, to serve the community, and contribute towards the knowledge-based economy.
2.	**Department of Medical Equipment Technology, College of Applied Medical Sciences, Majmaah University**	The department Mission is to qualify distinctive and innovative competencies scientifically, skillfully and behaviorally in the field of medical equipment technology and to provide community services through an advanced academic environment.
3.	**Department of Biomedical Engineering, Faculty of Engineering, National University of Singapore**	• To provide quality biomedical engineering education through integration of engineering with the biomedical sciences. • To foster new knowledge and achieve leadership in biomedical engineering research, the development of novel technologies and innovative applications.
4.	**Department of Biomedical Engineering,**	To provide world-class biomedical engineering education to students who can employ

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientation of the University and Faculty:

#	The Department	Mission
	Faculty of Engineering, University of Hong Kong	engineering principles and methods to develop medical instrumentation, biomaterials, diagnostic and therapeutic devices, and other technologies needed in biology and medicine, and also to discover principles governing the functioning and structure of living systems.
5.	**Department of Engineering Technology, Surveying, and Digital Media, Faculty of Business and Technology, East Tennessee State University**	To enable the student to carry out the responsibilities and duties of a Biomedical Engineering Technologist
6.	**Department of Biomedical Equipment Technology, School of Computing and Technology, Eastern Mediterranean University**	To bring up well-qualified and highly-motivated intermediate workforce equipped with theoretical and practical information, possessing the skills to use computers and technology effectively when needed, following the new developments in their area of profession, communicating in a foreign language, easily adapting to changes, effectively working in a team, possessing cultural awareness and professional ethics in catering for the demand from the hospitals and health institutions both in Turkey and the TRNC.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientation of the University and Faculty:

4- Mapping of Department Mission to the University and Faculty Missions:

University Mission	Faculty of Medical Technology Mission	Department of Biomedical Engineering Technology Mission
Leadership of transformation/upturning headway in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence. قيادة التحول في إدارة وتقديم الرعاية الصحية مع كافة الشركاء من خلال وضع معيار التميز في التعليم والبحوث الطبية والتطبيقية وبما يلبي احتياجات المجتمع اليمني وخصوصيته والتأثير الإقليمي	Participation in Leadership of transformation/upturning for the better in the management and delivery of health care through the provision of distinguished educational and research services, to graduate qualified cadres in thought and practice in the field of Biomedical engineering technology, medical information technology and capable of meeting the needs of the local community and regional influence.	Participation in Leadership of transformation/upturning for the better through prepare distinguished and well-qualified graduates who are capable of meeting the market demands in the field of biomedical engineering technology, by providing high quality academic programs and appropriate learning and research environment.

5- Objectives (Educational) of the Corresponding Departments and Suggested Objectives:

#	The Department	Objectives
1.	**Department of Biomedical Technology, College of applied medical sciences, King Saud University**	1. To achieve successful careers in biomedical instrumentation technology 2. To become successful technical advisors, managers, and techno-entrepreneurs 3. To pursue life-long learning and become successful educators for healthcare community through higher education and continual professional development.
2.	**Department of Medical Equipment Technology, College of Applied Medical Sciences, Majmaah University**	The BMET Program Educational Objectives (PEOs) provide the link between the program and the needs of stakeholders as well as a link between the program and the missions of the university and CAMS. The BMET program education objectives are:

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientation of the University and Faculty:

#	The Department	Objectives
		1. Adept at applying their engineering and biological training to solving problems related to health and healthcare that are globally relevant and based on ethically sound principles. 2. Leaders in their respective careers in biomedical engineering or interrelated areas of industry, government, academia, and clinical practice. 3. Engaged in life-long learning by continuing their education in graduate or professional school or through opportunities for advanced career or professional training.
3.	**Department of Biomedical Engineering, Faculty of Engineering, National University of Singapore**	1. Apply the core concepts of Biomedical Engineering, its underlying sciences, and relevant technologies in their chosen profession. 2. Utilize effective communication, learning, and teamwork skills to facilitate continued professional development. 3. Possess a high standard of personal and professional integrity, and ethical responsibility. 4. Progress into positions of increasing leadership responsibilities.
4.	**Department of Biomedical Engineering, Faculty of Engineering, University of Hong Kong**	**Depth -** Graduates possess an understanding of the fundamental and interdisciplinary knowledge prerequisite for the practice of, or for advanced study in biomedical engineering, including its scientific principles, methods, rigorous analysis, and creative design. **Breadth -** Graduates possess broad and multidisciplinary education, including problem-solving skills and knowledge of important current issues in biomedical engineering, necessary for productive careers in the public or private sectors, or for the pursuit of graduate education. **Professionalism -** Graduates demonstrate skills for clear and cross-disciplinary communication and responsible teamwork, and professional attitudes and ethics, so that they are prepared for the complex modern work environment and for lifelong learning.
5.	**Department of Engineering Technology, Surveying, and Digital Media, Faculty of Business and Technology, East Tennessee State University**	1. Produce graduates that possess the technical and professional skills to have successful careers in regional, state, or national industries related to their discipline. 2. Pursue life-long learning so the BMET graduates can become the experts, advisors, or managers in their profession.
6.	**Department of Biomedical Equipment Technology, School of Computing and**	1. Are prepared as entry-level technicians responsible for the operation, inspection, installation, repair, maintenance and safety of patient-care and non-critical patient care equipment.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientation of the University and Faculty:

#	The Department	Objectives
	Technology, Eastern Mediterranean University	2. Develop skills for effective verbal and written communication, and for participating effectively in the execution of projects, and to foster professional attitudes and awareness of the benefits of life-long learning. 3. Have a learning environment that is based on open interaction with experienced staff and a curriculum that follows the developments in BET field with practical knowledge compatible with business requirements.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientation of the University and Faculty:

Department Head Faculty Dean Quality Unit President

6- Mapping of Department Objectives to the University and Faculty Objectives:

University Objectives	Faculty of Medical Technology Objectives	Department of Biomedical Engineering Technology Objectives
1- Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service. 2- Adopting student-cantered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work. 3- Attracting and Employing scientists, cadres and talents to gain minds and put an end for the "brain drain" in a way that promotes and ensures the availability of thinkers, businessmen and good citizens. 4- Developing the distinguished academic infrastructure continuously and establishing modern research and service centres with high efficiency that can give a real effect locally and regionally. 5- Enhancing the university status as a preferred partner for local, regional and international partnership through implementing creative styles of education, exchanging researches and knowledge, and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.	1- To produce highly qualified students in biomedical engineering technology and medical information technology field who fulfill Health care needs. 2- To enhance biomedical engineering technology and medical information technology as well as healthcare knowledge and skills in the society. 3- To contribute to the direction and future advancement of the national profile in the global competition and its increase dependency on biomedical engineering technology and medical information technology. 4- To display excellent academic quality and relevant to the academic and professional programs that enables students to meet the criteria required by future employers. 5- To extended the innovative application in biomedical engineering technology and medical information technology by providing services to the community.	1- To provide distinguished and excellent academic programs in field of biomedical engineering technology. 2- To encourage creative and innovative thinking to identify and solve the medical engineering problems to serve the needs of health-care organization. 3- To implement acquired knowledge of biomedical technology in efficient and effective manner to construct biomedical engineering solution to solve health problem in dynamic environment. 4- To acquire skills to communicate and work effectively as an individual or as member in team and follow appropriate biomedical engineering practices with professional, societal, legal, and ethical responsibility. 5- To pursue lifelong learning, career development and provide foundation for research and further studies.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientation of the University and Faculty:

Biomedical Engineering Technology Program Specification

Annex- 2, Academic Standards Curriculum Criteria of Accreditation Board

1.

Council for Accreditation & Quality Assurance

National Academic Reference Standards (NARS) For Undergraduate Engineering Programs

First Edition

Council for Accreditation & Quality Assurance, Yemen

May 2018

2

ACCREDITATION BOARD FOR ENGINEERING AND TECHNOLOGY
(ABET)

CRITERIA FOR ACCREDITING

ENGINEERING PROGRAMS 2019-2020

(Bioengineering, Biomedical Engineering)

ABET
415 N. Charles Street
Baltimore, MD 21201
Telephone: 410-347-7700
E-mail: accreditation@abet.org
Website: www.abet.org

Biomedical Engineering Technology Program Specification

Annex- 3, Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research

Attached Separately

Biomedical Engineering Technology Program Specification

Annex- 4, Survey of Similar Accredited Programs at National and International Universities (Benchmarks)

* National Academic Reference Standards (NARS) * The National Architectural Accrediting Board (NAAB) * National Authority of Quality Assurance and Accreditation of Education (QAAE)
* Middle States Commission on Higher Education (MSCHE) * European Credit Transfer and Accumulation System (ECTS)

#	The Academic Program	The University	The Faculty	The Department	The Country	Program Accrediting Body	Degree Award at Program Completion	Year of accreditation	Study Duration
Current Program	Biomedical Engineering Technology	21 September University - for Medical and Applied Sciences	Medical Technology	Biomedical Engineering Technology	Yemen	Under Accreditation	Bachelor of Biomedical Engineering Technology		4
The 1st Program	Biomedical Technology-Instruments	King Saud University	College of applied medical sciences	Biomedical Technology	KSA	ABET	Bachelor of Science in Biomedical Technology	Oct 1, 2010 – Present	4
The 2nd Program	Biomedical Equipment Technology	Majmaah University	College of Applied Medical Sciences	Medical Equipment Technology	KSA	ABET	Bachelor of Biomedical Equipment Technology	Aug 07, 2015 – Present	4
The 3rd Program	Biomedical Engineering	National University of Singapore	Engineering	Biomedical Engineering	Singapore	EAB , ABET	Bachelor of Biomedical Engineering		4
The 4th Program	Biomedical Engineering	The University of Hong Kong	Engineering	Biomedical Engineering	China	ABET	Bachelor of Biomedical Engineering	2014	4
The 5th Program	Biomedical Engineering Technology	East Tennessee State University	Business and Technology	Engineering Technology, Surveying, and Digital Media	USA	ABET	Bachelor of Science in Biomedical Engineering Technology	Oct 1, 2012 – Present	4
The 6th Program	Biomedical Equipment Technology	Eastern Mediterranean University	School of Computing and Technology	Biomedical Equipment Technology	Turkey	Euro-Inf Label , ASIIN accreditation	Bachelor of Science in Biomedical Engineering Technology		3

Annex- 5, Survey on Mission and Objectives of the Program and Similar Accredited Programs and its Alignment to the University, Faculty, and Department Missions and 0bjectives

1- Survey on Mission and Objectives of the Program and Similar Accredited Programs

University	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University	21 September University
Faculty	College of applied medical sciences	College of Applied Medical Sciences	Engineering	Faculty of Engineering	Business and Technology	School of Computing and Technology	Medical Technology
Department	Biomedical Technology	Medical Equipment Technology	Biomedical Engineering	Biomedical Engineering	Engineering Technology, Surveying, and Digital Media	Biomedical Equipment Technology	Biomedical Engineering Technology
Program	Biomedical Technology - Instruments	Biomedical Equipment Technology	Biomedical Engineering	Biomedical Engineering.	Biomedical Engineering Technology	Biomedical Equipment Technology	Biomedical Engineering Technology
Country	Kingdom of Saudi Arabia	KSA	Singapore	China	United States	Turkey	Yemen
Program Mission	Preparing highly competent graduates in the field of Biomedical Equipment Technology to support the health care sector, and to serve the community.	To graduate distinctive and innovative competencies scientifically, skillfully and behaviorally in the field of medical equipment technology, and providing community services through	1. To provide quality biomedical engineering education through integration of engineering with the biomedical sciences. 2. To foster new knowledge	To provide world-class biomedical engineering education to students who can employ engineering principles and methods to develop medical instrumentation, biomaterials,	To enable the student to carry out the responsibilities and duties of a Biomedical Engineering Technologist	To bring up well-qualified and highly-motivated intermediate workforce equipped with theoretical and practical information, possessing the skills to use computers and technology effectively when needed, following	Participation in Leadership of transformation/upturning for the better through providing quality education for preparing highly competent graduates with a solid biomedical engineering technology education who can employ engineering principles and methods to develop

		an advanced academic environment.	and achieve leadership in biomedical engineering research, the development of novel technologies and innovative applications.	diagnostic and therapeutic devices, and other technologies needed in biology and medicine, and also to discover principles governing the functioning and structure of living systems.		the new developments in their area of profession, communicating in a foreign language, easily adapting to changes, effectively working in a team, possessing cultural awareness and professional ethics in catering for the demand from the hospitals and health institutions both in Turkey and the TRNC.	and maintenance medical instrumentation, diagnostic and therapeutic devices, and other technologies needed in biology and medicine.
Program Objectives	4. To achieve successful careers in biomedical instrumentation technology 5. To become successful technical advisors, managers, and techno-entrepreneurs 6. To pursue life-long learning and become successful	The BMET Program Educational Objectives (PEOs) provide the link between the program and the needs of stakeholders as well as a link between the program and the missions of the university and CAMS. The BMET program education	5. Apply the core concepts of Biomedical Engineering, its underlying sciences, and relevant technologies in their chosen profession. 6. Utilize effective communication, learning,	**Depth -** Graduates possess an understanding of the fundamental and interdisciplinary knowledge prerequisite for the practice of, or for advanced study in biomedical engineering, including its scientific	3. Produce graduates that possess the technical and professional skills to have successful careers in regional, state, or national industries related to their discipline. 4. Pursue life-long learning so the BMET graduates can	4. Are prepared as entry-level technicians responsible for the operation, inspection, installation, repair, maintenance and safety of patient-care and non-critical patient care equipment. 5. Develop skills for effective verbal and written	**PEO1.** Prepare qualified graduates possess broad and multidisciplinary education, including problem-solving skills and knowledge of important current issues in biomedical engineering technology. **PEO2.** Preparing an adapted leader in providing and preparing seminars, trainings and

	educators for healthcare community through higher education and continual professional development.	objectives are: 1. Adept at applying their engineering and biological training to solving problems related to health and healthcare that are globally relevant and based on ethically sound principles. 2. Leaders in their respective careers in biomedical engineering or interrelated areas of industry, government, academia, and clinical practice. 3. Engaged in life-long learning by continuing their education in	and teamwork skills to facilitate continued professional development. 7. Possess a high standard of personal and professional integrity, and ethical responsibility . 8. Progress into positions of increasing leadership responsibilities.	principles, methods, rigorous analysis, and creative design. **Breadth -** Graduates possess broad and multidisciplinary education, including problem-solving skills and knowledge of important current issues in biomedical engineering, necessary for productive careers in the public or private sectors, or for the pursuit of graduate education. **Professionalism -** Graduates demonstrate skills for clear and cross-disciplinary communication and responsible	become the experts, advisors, or managers in their profession.	communication, and for participating effectively in the execution of projects, and to foster professional attitudes and awareness of the benefits of life-long learning. 6. Have a learning environment that is based on open interaction with experienced staff and a curriculum that follows the developments in BET field with practical knowledge compatible with business requirements.	consultations in the field of maintenance of biomedical engineering technology. **PEO3.** Establishing leaders to lead a transformation in biomedical engineering technology or interrelated fields of healthcare, academia, and clinical practice. **PEO4.** To acquire skills to communicate and work effectively as an individual or as member in team and follow appropriate medical engineering practices with professional, societal, legal, and ethical responsibility. **PEO5.** Consolidate the maintenance principles of biomedical devices and continuing professional and educational development by pursuing lifelong learning and becoming

		graduate or professional school or through opportunities for advanced career or professional training.		teamwork, and professional attitudes and ethics, so that they are prepared for the complex modern work environment and for lifelong learning.			successful educators for the healthcare community.
Program ILOs	1. Ability to apply acquired knowledge into the internship working field 2. Ability to analyze a problem, identify and define the requirements appropriate to its solution 3. Ability to function effectively on teams to accomplish a common goal 4. Ability to understand professional, ethical, legal,	1. A knowledge of the impact of engineering technology solutions in societal and global context 2. An ability to select and apply knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or	1. Apply knowledge of mathematics, science and engineering to the solution of complex engineering problem 2. Design and conduct experiments, analyse, interpret data and synthesise valid conclusions. 3. Design a system, component, or process,	1. Upon successful completion of the curriculum, students should be able to possess: a. an ability to apply knowledge of mathematics, science, and engineering appropriate to the biomedical engineering (BME) discipline b. an ability to design and	Biomedical Engineering Technology students are expected to have demonstrated proficiency in the following areas: 1. The interaction of medical equipment* with the human body; 2. The principles of medical equipment, safety and operational tests, the use of test results in order to improve processes and	1. Use theoretical and practical knowledge and skills to analyse, troubleshoot, and maintain systems and devices used in the biomedical equipment industry. 2. Can apply acquired skills and learn new skills by engaging in lifelong learning 3. Can work as a productive and responsible team member. 4. Can adapt to changing business	**A. Knowledge and Understanding:** Upon successful completion of the Program, the graduates will be able to: **A1** Demonstrate an understanding of appropriate models, theories, mathematical foundations, and techniques related to biomedical engineering technology disciplines. **A2** Demonstrate a profound knowledge in maintenance, troubleshooting, tools, techniques, practices, and methods, utilizing and adapting biomedical engineering technology for solving

	security, and social issues and responsibilities 5. Ability to communicate effectively with a range of audiences.	methodologies; 3. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives; 4. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities; 5. An ability to identify, analyze, and solve broadly-	and synthesise solutions to achieve desired needs. 4. Identify, formulate, research through relevant literature review, and solve engineering problems reaching substantiated conclusions. 5. Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural,	conduct experiments, as well as to analyse and interpret data c. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the BME discipline d. an ability to recognise the need for, and to engage in life-long learning an ability to use the computer/IT tools relevant to the BME discipline along with an understanding of their processes and	ensure that equipment is functioning properly and safely with appropriate documentation; 3. The clinical application of computer networks, networking protocols, and medical device interoperability including data security and privacy standards; 4. Potential unsafe conditions related to the use of medical equipment and systems, preventative and corrective actions including risk mitigation; 5. Technology utilized in specialized clinical areas	requirements by using their practical skills. 5. Have improved skills in oral and written communication in the biomedical technology field. 6. Have basic English knowledge in oral and written communication. 7. Are aware of the importance of use of professional ethics in the biomedical technology field.	biomedical devices and equipment's problems in health environment. **A3** Identify user and healthcare needs to provide biomedical engineering technology maintenance based solutions to real-world problem. **A4** Demonstrate a sound understanding the biomedical engineering technology concept related to maintenance, troubleshooting, programming, utilizing, analysis, design, implementation, and evaluation of biomedical equipment's, devices and systems. **B. Cognitive/ Intellectual Skills:** Upon successful completion of the Program, the graduates will be able to: **B1.** Critically analyze complex biomedical devices and equipment's

		defined engineering technology problems; 6. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes; 7. An ability to function effectively as a member or leader on a technical team; 8. An understanding of the need for and an ability to engage in self-directed continuing professional development; 9. An	societal, and environmental constraints. 6. Communicate effectively. 7. Recognize the need for, and have the ability to engage in life-long learning. 8. Understand the impact of engineering solutions in a societal context and to be able to respond effectively to the needs for sustainable development. 9. Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective	limitations 2. Upon successful completion of the curriculum, students should be able to possess: a. an ability to design a system, component or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability b. an ability to identify, formulate and solve engineering	such as patient imaging and the operating room, including the interconnectedness (connectivity) of medical devices and systems; 6. The principles of project management to the healthcare setting; 7. The financial information associated with the process of clinical equipment acquisition, management and support including budgeting and life-cycle planning.		problems, faults and propose appropriate biomedical devices maintenance based solutions and integrate them effectively into the uses and healthcare organizations. **B2.** Analyze the impacts of biomedical devices and equipment's problems and faults on health objectives, customer needs and consider them during the purchasing, maintenance, selection, integration, configuration and administration of biomedical devices, equipment's and systems. **B3.** Explore variety of challenges and problems related to maintenance, troubleshooting and performance of biomedical devices to select the optimal solution. **B4.** Evaluate biomedical engineering

Annex- 5, Survey on Mission and Objectives of the Program and Similar Accredited Programs and its Alignment to the University, Faculty, and Department Missions and 0bjectives

		understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity; 10. A commitment to quality, timeliness, and continuous improvement. 11. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.	project management. 10. Understand professional, ethical and moral responsibility.	problems 3. Upon successful completion of the curriculum, students should be able to possess: a. an ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public b. an ability to understand professional and ethical responsibility			based solution to meet a given set of health requirements in the context of biomedical engineering technology discipline. **C. Practical and Professional Skills:** Upon successful completion of the Program, the graduates will be able to: **C1.** Employ effectively the biomedical engineering technology concepts, principles of engineering, maintenance and evaluation tools, techniques used for the analysis and troubleshooting of medical devices faults of varying complexity. **C2.** Design, implement, and test an biomedical devices and equipment's maintenance based solution to meet a given set of engineering requirement in the

							context of biomedical engineering technology. **C3.** Use systematic approaches to maintenance, select, develop and administrate biomedical devices and equipment's to accomplish user and health goals. **C4.** Use the techniques, skills, and necessary tools for biomedical engineering practices. **D. General and Transferable Skills:** Upon successful completion of the Program, the graduates will be able to: **D1.** Function effectively as an individual, as a member, or leader of a team engaged in appropriate activities to the biomedical engineering technology disciplines to accomplish a common goal.

							D2. Commit to professional ethics, responsibilities, and norms of professional biomedical engineering practices. **D3.** Communicate effectively in writing and orally in a variety of professional contexts. **D4.** Engage in continuing professional development and lifelong learning as an biomedical engineering technology professional.

Annex- 5, Survey on Mission and Objectives of the Program and Similar Accredited Programs and its Alignment to the University, Faculty, and Department Missions and 0bjectives

2- Mapping of Program Mission with the University, Faculty and Department Missions:

University Mission	Faculty of Medical Technology Mission	Department Biomedical Technology Mission	Biomedical Engineering Technology Program Mission
Leadership of transformation/upturning headway in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.	Participation in Leadership of transformation/upturning for the better in the management and delivery of health care through the provision of distinguished educational and research services, to graduate qualified cadres in thought and practice in the field of Biomedical engineering technology, medical information technology and capable of meeting the needs of the local community and regional influence.	Participation in Leadership of transformation/upturning for the better through prepare distinguished and well-qualified graduates who are capable of meeting the market demands in the field of biomedical engineering technology and medical information technology, by providing high quality academic programs and appropriate learning and research environment.	Participation in Leadership of transformation/upturning for the better through providing quality education for preparing highly competent graduates with a solid biomedical engineering technology education who can employ engineering principles and methods to develop and maintenance medical instrumentation, diagnostic and therapeutic devices, and other technologies needed in biology and medicine.

Annex- 5, Survey on Mission and Objectives of the Program and Similar Accredited Programs and its Alignment to the University, Faculty, and Department Missions and 0bjectives

3- Mapping of Program Objectives with the University, Faculty and Department Objectives:

University Objectives	Faculty of Medical Technology Objectives	Department of Biomedical Technology Objectives	Biomedical Engineering Technology Program Objectives
1.	1. To produce highly qualified students in biomedical engineering technology and medical information technology field who fulfill Health care needs. 2. To enhance biomedical engineering technology and medical information technology as well as healthcare knowledge and skills in the society. 3. To contribute to the direction and future advancement of the national profile in the global competition and its increase dependency on biomedical engineering technology and medical information technology. 4. To display excellent academic quality and relevant to the academic and professional programs that enables students to meet the criteria required by future employers. 5. To extended the innovative application in biomedical engineering technology and medical information technology by providing services to the community.	1. To provide distinguished and excellent academic programs in field of medical technology. 2. To encourage creative and innovative thinking to identify and solve the medical technology problems to serve the needs of health-care organization. 3. To implement acquired knowledge of medical technology in efficient and effective manner to construct medical technology solution to solve health problem in dynamic environment. 4. To acquire skills to communicate and work effectively as an individual or as member in team and follow appropriate medical technology practices with professional, societal, legal, and ethical responsibility. 5. To pursue lifelong learning, career development and provide foundation for research and further studies.	**PEO1.** Prepare qualified graduates possess broad and multidisciplinary education, including problem-solving skills and knowledge of important current issues in biomedical engineering technology. **PEO2.** Preparing an adapted leader in providing and preparing seminars, trainings and consultations in the field of maintenance of biomedical engineering technology. **PEO3.** Establishing leaders to lead a transformation in biomedical engineering technology or interrelated fields of healthcare, academia, and clinical practice. **PEO4.** To acquire skills to communicate and work effectively as an individual or as member in team and follow appropriate medical engineering practices with professional, societal, legal, and ethical responsibility. **PEO5.** Consolidate the maintenance principles of biomedical devices and continuing professional and educational development by pursuing lifelong learning and becoming successful educators for the healthcare community.

Annex- 6, Alignment of Program Intended Learning Outcomes (PILOs) to the Faculty Objective

Program PILOs	Faculty Objectives				
	FObj1	FObj2	FObj3	FObj4	FObj5
A1		√	√		
A2	√				
A3	√		√	√	
A4			√	√	
B1					
B2		√	√	√	√
B3			√		√
B4		√		√	√
C1	√			√	
C2	√	√		√	
C3		√	√		
C4				√	
D1	√	√			√
D2		√			√
D3		√			√
D4			√	√	√

Biomedical Engineering Technology Program Specification

Annex- 7, Alignment of Program Intended Learning Outcomes (PILOs) to the Department Objective

Program PILOs	Department Objectives				
	DObj1	DObj2	DObj3	DObj4	DObj5
A1	√	√			
A2		√			
A3	√	√	√		
A4					
B1		√			
B2	√				
B3	√				
B4	√	√			
C1			√		
C2			√		
C3	√		√		
C4			√		
D1				√	
D2					√
D3		√		√	√
D4	√				√

Biomedical Engineering Technology Program Specification

Annex- 8, Alignment of Program Intended Learning Outcomes (PILOS) to Program Objectives (POs)

Program PILOs	Program Objectives				
	POBj1	POBj2	POBj3	POBj4	POBj5
A1	√				
A2			√		
A3	√		√		
A4	√				
B1					
B2	√	√			
B3		√			
B4	√	√		√	
C1		√			
C2		√	√		
C3		√	√		
C4		√			
D1					√
D2					√
D3				√	√
D4					√

Biomedical Engineering Technology Program Specification

Annex- 9, Mapping of Program Objectives to the Faculty Mission

Program Objectives	Faculty Mission				
	Highly qualified graduates	Professional skills	Knowledge contribution	Society needs	Excellent academic programs
PEO1	√	√	√		√
PEO2	√	√	√	√	√
PEO3		√	√	√	√
PEO4	√	√	√	√	√
PEO5	√	√	√	√	√

Biomedical Engineering Technology Program Specification

Annex- 10, Mapping Program Objectives to the Department Mission

Program Objectives	Department Mission			
	well-qualified graduates	Market needs	high quality academic programs	Professional Education
PEO1	√		√	√
PEO2	√	√	√	√
PEO3			√	√
PEO4	√	√	√	√
PEO5	√	√	√	√

Biomedical Engineering Technology Program Specification

Annex- 11, Mapping of Program Objectives (POs) to the Department Objectives

Program Objectives	Department Objectives				
	DObj1	DObj2	DObj3	DObj4	DObj5
PEO1	√	√	√	√	
PEO2	√	√	√		√
PEO3	√		√	√	√
PEO4	√	√	√	√	√
PEO5	√	√	√	√	√

Biomedical Engineering Technology Program Specification

Annex- 12, Survey of PILOs for Similar Accredited Programs at National and International Universities

Program PILOs	Similar Accredited Programs					
	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University
A1	1	1,2	1	A	1,2,3,4,5,6,7	1,2,6
A2	1	2,8	1,4,7	1A,1D	2,3,5	1,6
A3	1,2	1,2,4,8	1,4,5,8	1A,1C,1D	3,4	1,2
A4	1,3,4	2,3,4	1,2,4,5,7,10	1A,1C	2,3,4,5,7	1
B1	2	5,6,11	4,5	1A,2B,3A	2	2
B2	2	2,4,6,8	4,5,8	3A	4	
B3	2,4	2,5,8,11	4,8	2B	2	
B4	2,4	4,5	2,3,4,5	2B,3A		
C1	1,2	3,4,5,6	1,2,3,4,5,8	1A,1D,2A,2B	2,3,4	
C2	1,2,4	3,4,6,11	2,3	2A	2,4,5	
C3	1,2,4	3,4,6,11	5,8	2B,3A	2,3,4,5	
C4	1,2	2,4,5,6,11	5	2A,2B	1,2,3,4,5	
D1	3,4,5	7,8,9,10	9			3,4
D2	4,5	9,10,11	10	3B		7
D3	3,5	9,11	6			4,5,6
D4	1	8,11	9,9			2,4

Biomedical Engineering Technology Program Specification

اسم هيئة الاعتماد: مجلس الاعتماد الأكاديمي وضمان جودة التعليم العالي، اصدار المعايير: مايو 2018م إن وجد

Annex- 13, Alignment of Program PILOs with Council of Accreditation and ABET Standards

Accreditation Body: National Academic Reference Standards (NARS), Yemen, May 2018

Program PILOs	NARS (Yemen), ILOs for Programs	ABET Students Criterion
A1	A1	
A2	A2	
A3	A3	
A4	A6,A9	
B1	B1	
B2	B2	
B3	B3	
B4	B5	
C1	C1	
C2	C2	
C3	C4,C5	
C4	C3	
D1	D1,D3	
D2	D4	
D3	D2,D7	
D4	D5	

1- National Academic Reference Standards For Undergraduate Engineering Programs, Yemen, May 2018:

I. GRADUATE ATTRIBUTES

Upon successful completion of an undergraduate computing program, the graduates will be able to:

1. Apply knowledge of mathematics, sciences and engineering.
2. Design systems, components and processes to meet the desired needs within realistic constrains.
3. Design and conduct experiments safely and analyze and interpret data properly.
4. Identify, formulate and solve fundamental engineering problems using different techniques, skills and appropriate engineering tools.
5. Carry out a search of literature, use databases and analyze the results to come up with valid conclusions.
6. Work productively and communicate effectively in teams.
7. Engage in lifelong learning and commit to professional ethics.
8. Consider the impact of engineering solutions on society and environment.

II. LEARNING OUTCOMES

A. Knowledge and Understanding

Upon successful completion of the undergraduate computing education programs, the graduates will be able to demonstrate understanding of:

A.1 Mathematics and science related to engineering.
A.2 Principles of design including elements design, process and/or a system.
A.3 Methodologies of solving engineering problems, data collection and interpretation.
A.4 Characteristics of engineering materials related to the discipline.
A.5 Necessary knowledge for sustainable development.
A.6 Knowledge and understanding of engineering management principles.
A.7 Professional ethics and its impact on engineering practices.

A.8 Knowledge of societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
A.9 . Basics of information and communication technologies.

B. Cognitive / Intellectual Skills

Upon successful completion of an undergraduate computing education program, the graduates will be able to:

B.1 Identify, formulate and solve engineering problems using established methods.
B.2 Analyze engineering systems, products, processes and methods.
B. 3 Select appropriate methods for solving engineering problems based on analytical thinking.
B. 4 Design and conduct appropriate experiments, interpret data and draw conclusions.
B. 5 Think creatively and innovatively in solving problems and design process.
B. 6 Incorporate economic, social and environmental dimensions as well as management in design.

C. Practical and Professional Skills:

Upon successful completion of an undergraduate computing education program, the graduates will be able to:

C 1. Use laboratory and workshop equipment safely to generate valuable data.
C 2. Implement a designed process, a component or a system to meet the desired needs within realistic constrains.
C 3. Use techniques, equipment and computing tools efficiently.
C 4. Employ basic knowledge of project management skills and quality assurance procedures.
C 5. Perform feasibility studies and prepare budgets and management for engineering projects.

D. General and Transferable Skills

Upon successful completion of an undergraduate engineering education program, the graduates will be able to:

D1. Work productively as an individual and as a member of a team.
D2. Communicate effectively both orally and in written forms.
D3. Effectively manage tasks, time and resources.

D4. Apply ethical principles and commit to professional ethics.
D5. Engage in independent lifelong learning.
D6. Deliver presentations to different kinds of audiences.
D7. Prepare and present effective technical reports.
D8. Conduct searches of literature and use databases and other sources of information.
D9. Master Arabic and English technical writings.

2- ABET: Criteria for Accrediting Engineering Programs,

1- Curriculum

1-1. General Engineering Programs:

The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The program curriculum must provide adequate content for each area, consistent with the student outcomes and program educational objectives, to ensure that students are prepared to enter the practice of engineering. The curriculum must include:

(a) a minimum of 30 semester credit hours (or equivalent) of a combination of college-level mathematics and basic sciences with experimental experience appropriate to the program.
(b) a minimum of 45 semester credit hours (or equivalent) of engineering topics appropriate to the program, consisting of engineering and computer sciences and engineering design, and utilizing modern engineering tools.
(c) a broad education component that complements the technical content of the curriculum and is consistent with the program educational objectives.
(d) a culminating major engineering design experience that 1) incorporates appropriate engineering standards and multiple constraints, and 2) is based on the knowledge and skills acquired in earlier course work.

1-2. Bioengineering, Biomedical Engineering

The structure of the curriculum must provide both breadth and depth across the range of engineering and science topics consistent with the program educational objectives and student outcomes. The curriculum must prepare graduates with experience in:

(a) Applying principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations) and statistics;
(b) Solving bio/biomedical engineering problems, including those associated with the interaction between living and non-living systems;
(c) Analyzing, modeling, designing, and realizing bio/biomedical engineering devices, systems, components, or processes; and
(d) Making measurements on and interpreting data from living systems.

2- Student Outcomes

The program must have documented student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes that may be articulated by the program:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Biomedical Engineering Technology Program Specification

Annex- 14, Survey of Credit Hours of Similar Programs

Benchmarking		King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University	21 September University - for Medical and Applied Sciences	Average Cr. Hrs.
University Requirements	Credit Hours	33	-	20	54	12	-	14	**26.60**
	Percentage	19.5%	-	12.5%	22.5%	9.4%	-	9.4%	**14.7%**
University Electives	Credit Hours	6	12	32	-	6	-	-	**14.00**
	Percentage	3.6%	8. 57 %	20.0%	-	4.7%	-		**7.1%**
Faculty Requirements	Credit Hours	9	2	6	42	15	9	23	**15.14**
	Percentage	5.3%	1,43 %	3.8%	17.5%	11.7%	7.9%	15.4%	**8.8%**
Faculty Electives	Credit Hours	6	4	-	12	6	9	-	**7.40**
	Percentage	3.6%	2.9%	-	5.0%	4.7%	7.9%		**4.8%**
Department Requirements	Credit Hours	6	19	34	30	15	9	26	**19.86**
	Percentage	3.6%		21.3%	12.5%	11.7%	7.9%	17.4%	**10.6%**
Major Requirements	Credit Hours	76	87	28	90	68	57	75	**68.71**
	Percentage	50.0%	62.1%	17.5%	37.5%	53.1%	50.0%	50.3%	**45.8%**
Major Electives	Credit Hours	6	6	8	-	6	-	-	**6.50**
	Percentage	3.6%	4.3%	5.0%	-	4.7%	-	-	**4.4%**
Practical Courses	Credit Hours	6	29	14	12	-	-	-	**15.25**
	Percentage	3.6%	71.2%	8.8%	5.0%	-	-	-	**22.1%**
Training Courses	Credit Hours	6	-	10	-	30	30	6	**16.40**
	Percentage	3.6%	-	6.3%	-	1.6%	26.3%	4.0%	**8.3%**
Project Courses	Credit Hours	-	-	-	-	-	-	5	**5.00**
	Percentage	-	-	-	-	-	-	3.4%	**3.4%**
Total Credit Hours	**Credit Hours**	**169**	**140**	**160**	**240**	**128**	**114**	**149**	**157**

Biomedical Engineering Technology Program Specification

Annex- 15, Survey of Number of Courses and Credit Hours of Similar Programs

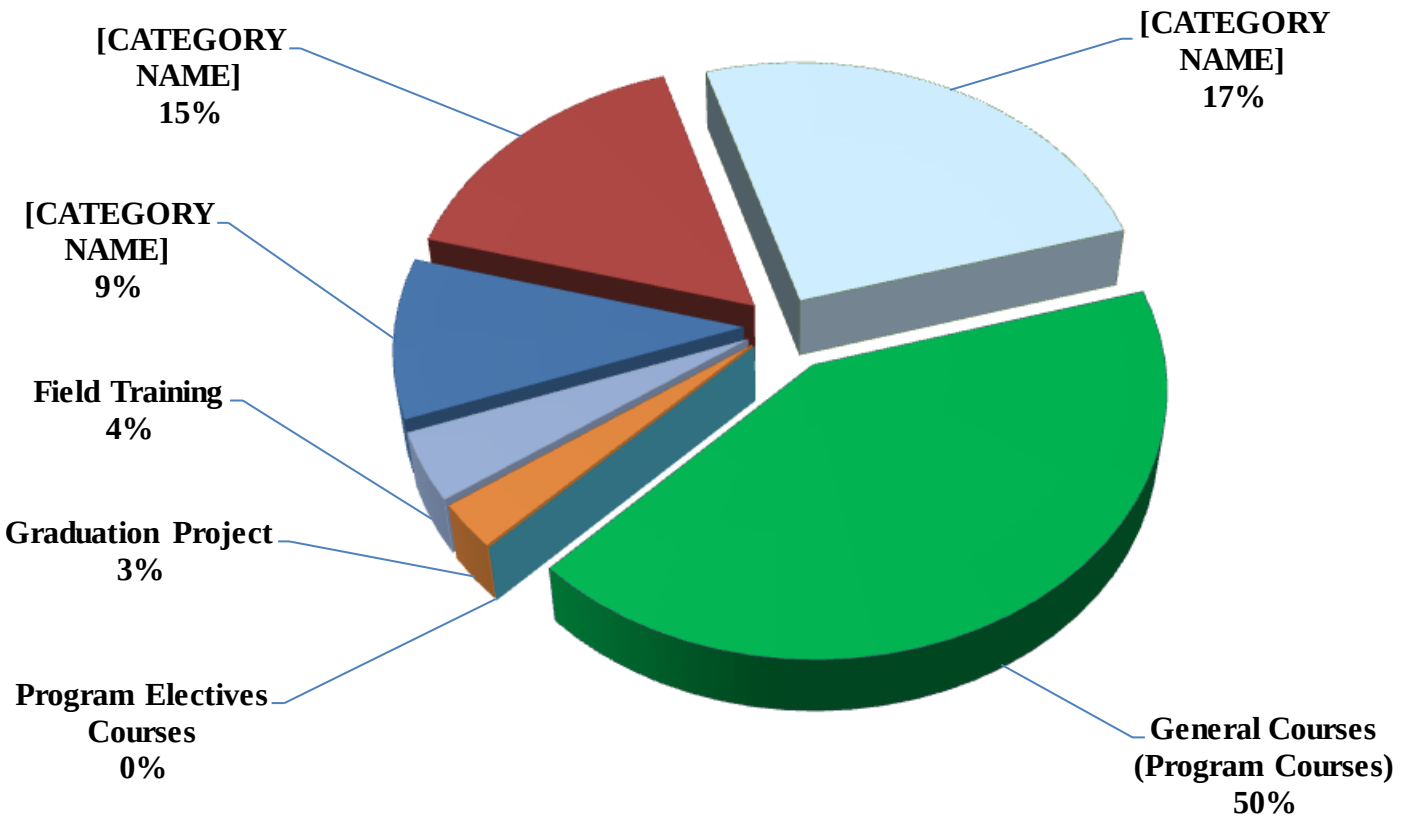
University		King Saud University		Majmaah University		National University of Singapore		The University of Hong Kong		East Tennessee State University		Eastern Mediterranean University		21 September University - for Medical and Applied Sciences		Average	
Total Courses and Cr. Hrs.		Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses
University Requirements	Compulsory	33	9	-	-	20	5	54	9	12	4	-	-	14	7	27	7
	Electives	6	3	12	6	32	8	-	-	6	2	-	-	-	-	21	5
Faculty Requirements	Compulsory	9	3	2	1	6	3	42	7	15	5	9	3	23	11	15	5
	Electives	6	3	4	2	-	-	12	2	6	2	9	3	-	-	7	2
Department Requirements	Compulsory	6	3	-	-	34	10	30	15	15	5	9	3	26	11	20	8
	Electives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Requirements	Compulsory	76	29	87	34	28	7	90	15	68	19	57	19	75	29	69	22
	Electives	6	3	6	6	8	4			6	3					5	4
	Graduation Project	-	-	-	-	-	-	-	-	-	-	-	-	5	2	5	2
	Summer Training	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Field Training	-	-	-	-	10	1	-	-	30	2	30	2	6	1	19	2
	Practical Skills	6	2	-	-	-	-	-	-	-	-	-	-	-	-	6	2
Other Courses		-	-	29	9	14	2	12	2	-	-	-	-	-	-	18	4
Total		Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses
		148	55	140	58	152	40	240	50	158	42	114	30	149	61	157	48

Biomedical Engineering Technology Program Specification

Annex- 16, Themes of Courses of Study and their Weightage

#	Themes	No. of Courses	Credit Hours	Percentage of Cr. Hrs.
0	University Requirements	7	14	9%
1	Faculty Requirements	11	23	15%
2	Department Courses	11	26	17%
3	General Courses (Program Courses)	29	75	50%
4	Electives Courses (Program Courses)	-	-	0%
5	Graduation Project Courses	2	5	3%
6	Field Training	1	6	4%
Program Total		61	149	100%

Themes of Courses of Study and their Weightage



Annex- 16, Themes of Courses of Study and their Weightage

Department Head	Faculty Dean	Quality Unit	President

Biomedical Engineering Technology Program Specification

Annex- 17, Coding System

Program	Level	Theme Code	No. of the course in the list
AAA	1	0	1

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
University Requirements	0	**1.**	Arabic 101	06.11.701	2	2				Level 1/ semester 1
		2.	Arabic 102	06.11.702	2	2			06.11.701	Level 2/ semester 1
		3.	English 101	06.11.703	2	2				Level 1/ semester 1
		4.	English 102	06.11.704	2	2			06.11.703	Level 2/ semester 1
		5.	Islamic Culture	06.11.705	2	2				Level 1/ semester 1
		6.	National Culture	06.11.706	2	2				Level 1/ semester 1
		7.	Arabic Israeli Conflict	06.11.707	2	2				Level 2/ semester 1
Total					14	14	0	0		

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
Faculty Requirements	1	**1.**	Fundamentals of Nursing	04.01.701	2	2			04.02.702	Level 1/ semester 1
		2.	Medical Terminology	04.02.702	2	2			04.01.701	Level 1/ semester 1
		3.	Anatomy and Physiology	01.01.703	2	2			04.02.701, 04.02.702	Level 1/ semester 2
		4.	Principle of Health Management	05.01.704	2	2				Level 1/ semester 2
		5.	Communication skills and Presentation	05.01.705	2	2				Level 1/ semester 2
		6.	Medical Statistics	05.02.706	3	2		2	07.02.711, 07.02.712	Level 2/ semester 1
		7.	General biology	03.01.707	2	2				Level 2/ semester 1
		8.	Principles of Marketing for medical devices and supplies	05.01.708	2	2			05.01.704	Level 2/ semester 2
		9.	Total Quality Management	05.01.709	2	2			05.01.704	Level 3/ semester 1
		10.	Research methodology	05.02.710	2	2				Level 3/ semester 2
		11.	Entrepreneurship	05.01.711	2	2			05.01.708	Level 4/ semester 2
Total					**23**	**22**	**0**	**2**		

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
Department Requirements	2	**1.**	Computer fundamentals and programming	07.01.743	3	2		2		
		2.	Programming 2	07.01.744	3	2		2		07.01.743
		3.	Object-Oriented Programming	07.01.745	2	2			07.02.711	07.01.744
		4.	Computer Network	07.01.746	2	2			07.02.712	07.01.743
		5.	Operating System	07.01.747	2	2			07.02.713	07.01.744
		6.	Advanced Programming	07.01.748	2	2			07.02.714	07.01.744, 07.01.745
		7.	System Analysis and Design	07.01.749	3	2		2	07.02.712	07.01.747
		8.	Software Engineering	07.01.750	2	2			07.02.712, 07.02.714	07.01.748
		9.	Mobile Application Development	07.01.751	3	2		2	07.02.714, 07.02.718	07.01.745, 07.01.747
		10.	Artificial Intelligent	07.01.752	2	2			07.02.718, 07.02.719	07.01.745
		11.	Machine Learning	07.01.753	2	2			07.02.718, 07.02.720	07.01.752
Total					**26**	**22**	**0**	**8**		

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
General Courses (Program Courses)	3	**1.**	Math 1	07.02.711	3	2		2		Level 1/ semester 1
		2.	Math 2	07.02.712	3	2		2	07.02.711	Level 1/ semester 2
		3.	Math 3	07.02.713	3	2		2	07.02.712	Level 2/ semester 1
		4.	Physics	07.02.714	2	2				Level 1/ semester 2
		5.	Engineering Drawing	07.02.715	2	1		2	07.02.711	Level 2/

Themes	Theme	No.	Course Title	Course	Credit Hours				Prerequisites/	Level/Term
										semester 1
		6.	Statics	07.02.716	2	2			07.02.714	Level 2/ semester 2
		7.	Dynamics	07.02.717	2	2			07.02.714	Level 2/ semester 2
		8.	Electrical Circuits 1	07.02.718	3	2		2	07.02.714	Level 2/ semester 1
		9.	Electrical Circuits 2	07.02.719	3	2		2	07.02.718	Level 2/ semester 2
		10.	Digital Logic Design	07.02.720	3	2		2	07.02.718	Level 2/ semester 1
		11.	Biomedical Electronics 1	07.02.721	3	2		2	07.02.719	Level 3/ semester 1
		12.	Biomedical Electronics 2	07.02.722	3	2		2	07.02.721	Level 3/ semester 2
		13.	Microcontroller and Microprocessor	07.02.723	3	2		2	07.02.722	Level 3/ semester 2
		14.	Introduction to Biomedical Engineering Technology	07.02.724	2	2			04.02.702	Level 1/ semester 1
		15.	Biomedical Measurements and Instrumentations	07.02.725	3	2		2	07.02.724	Level 2/ semester 2
		16.	Special Topics on Biomedical Engineering Technology	07.02.726	3	2		2	07.02.725	Level 2/ semester 2
		17.	Biomaterials	07.02.727	2	2			01.01.703, 03.01.707	Level 3/ semester 1
		18.	Biomechanics	07.02.728	2	2			07.02.716, 07.02.717	Level 3/ semester 1
		19.	Biomedical Devices 1	07.02.729	3	2		2	07.02.725, 07.02.726	Level 3/ semester 1
		20.	Biomedical Devices 2	07.02.730	3	2		2	07.02.729	Level 3/ semester 2
		21.	Special studies (Seminars and Case Study) in Biomedical Engineering Technology	07.02.731	2			4	07.02.729, 07.02.730	Level 4/ semester 1
		22.	Biomedical signals processing	07.02.732	3	2		2	07.02.713, 07.02.725	Level 3/ semester 2
		23.	Artificial Organs and Extremities	07.02.733	2	2			07.02.728	Level 3/

Themes	Theme	No.	Course Title	Course	Credit Hours				Prerequisites/	Level/Term
										semester 2
		24.	Rehabilitation Procedures	07.02.734	2	2			07.02.733	Level 4/ semester 1
		25.	Clinical Engineering	07.02.735	3	2		2	07.02.730, 05.01.709	Level 3/ semester 2
		26.	Biomedical Devices Maintenance and Management 1	07.02.736	3	2		2	07.02.722, 07.02.730	Level 4/ semester 1
		27.	Biomedical Devices Maintenance and Management 2	07.02.737	3	2		2	07.02.736	Level 4/ semester 2
		28.	Safety for Biomedical Engineering Technology Specialists	07.02.738	2	2			07.02.719, 07.02.722, 07.02.736	Level 4/ semester 2
		29.	Occupational Ethics	07.02.739	2	2			05.01.705	Level 4/ semester 2
		30.	Final Project 1	07.02.740	2	2			07.02.730, 07.02.736, 07.01.749	Level 4/ semester 1
		31.	Final Project 2	07.02.741	3	2		2	07.02.737, 07.01.748, 07.01.753	Level 4/ semester 2
		32.	Field Training	07.02.742	6				07.02.737, 07.02.738, 07.02.741	Level 4/ semester 3
Total					**86**	**59**		**42**		

Biomedical Engineering Technology Program Specification

Annex- 18, Survey of Course Names per Academic Semesters of Similar Programs

University		21 September University	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University
No of Courses		61	54	55	40	41	40	30
Total Cr. Hrs.		149	169	140	160	240	128	71
Total Years		4 years	4 years	4 years	4 years	4 years	3 years	3 years
Level 1								
Semester	No	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name
1	1	English 101	English Language Skills	English Language	Materials Engineering Principles and Practice	Fundamental mechanics	Critical Reading and Expository Writing	Basic English I
	2	Arabic 101	Introduction to Mathematics	Introduction to Mathematics 1	Design and Make4	Electricity and electronics	ENGL 1020 - Critical Thinking and Argumentation	Mathematics for Electronic Technicians
	3	Islamic Culture	Computer skills	Computer Skills	Engineering Calculus	Calculus and ordinary differential equations	Introduction to Communication Studies	Anatomy And Physiology
	4	National Culture	Communication Skills	Communication Skills	Differential Equations for Engineering	Core University English	ENGL 2030 - Literary Heritage	Electrotechnology
	5	Fundamentals of Nursing		Introduction to chemistry	Biomedical Engineering Principles and Practice I	University Common Core Course	Art History Survey I	Introduction to Computing
	6	Medical		Biophysics	GE 1			Properties of

University		21 September University	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University
		Terminology						Electronic Materials
	7	Math 1		Biology				
	8	Introduction to Biomedical Engineering Technology						
	9	Computer principles and programming						
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2	1	English 102	Introduction to Organic Chemistry	Emergency care	Linear Algebra with Differential Equations	Fundamentals of chemistry and biology for biomedical engineering	Technology and Society	Basic English II
	2	Arabic 102	General Physics	Anatomy for Bioengineering	Programming Methodology	Electricity and electronics	Introduction to Cultural Anthropology	Electronics - I
	3	Arabic Israeli Conflict	Biology	Biomedical Physiology for Engineering	Critical Thinking & Writing	Computer programming I	Principles of Microeconomics	Digital Electronics
	4	Principle of Health Management	ENGL 145 English for Medical Purposes	MET 233 Basic mathematics	PC1432 Physics IIE	Linear algebra, probability& statistics	HIST 2010 - The United States to 1877	Computer Applications
	5	Anatomy and Physiology	Biostatistics	Bio-Physics	Biomedical Engineering Principles and Practice II	University Common Core Course	The United States since 1877	Medical Instrumentation - I
	6	Communication skills and Presentation		Bio-mechanics	Quantitative Reasoning (GE 2)			Medical Communication
	7	Math 2		Faculty Elective				Summer Practice
	8	Programming 2		University Elective				

University		21 September University	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University
	9	Physics						
		--	4	--	--	--	--	--
Level 2								
Semester	No	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name
1	1	Electrical Circuits 1	Biomedical Electronics (I)	Applied Mathematics 1	Introduction to Machine Learning	Thermofluid mechanics	General Physics I- Noncalculus	Electronics II
	2	Medical Statistics	BMT 227 Principles of Computing	MET 242 Physics for medical Equipment's	BN2201 Quantitative Physiology for Bioengineers	Engineering in biology and medicine	PHYS 2011 - General Physics Laboratory I- Noncalculus	Microprocessors
	3	General biology	Applied Mathematics for BMT (I)	Electrical circuits	Fundamentals of Biosignals Processing and Bioinstrumentation	Life sciences I (Biochemistry)	General Chemistry Lecture I	Medical Instrumentation II
	4	Math 3	Basic Mechanical Skills	Electrical skills	Organic Chemistry for Engineers	Biomedical signals and linear systems	General Chemistry Laboratory I	Fault Analysis in Biomedical Systems
	5	Digital Logic Design	Applied Physics for BMT	Computer and systems	GE 3	University Common Core Course	Probability and Statistics – Noncalculus	Medical Imaging Systems
	6	Object-Oriented Programming	Rehabilitation Procedures	Bio-materials	GE4		Computer Aided Design Drafting	Occupational Terminology
	7	Engineering Drawing		Faculty Elective				
	8	Computer Network						
		--	--	--	--	--	--	--
2	1	Electrical Circuits 2	Biomedical Electronics (II)	Applied Mathematics 2	Bioengineering Data Analysis	Engineering training	Technical Communication	Biomedical Signal Processing

University		21 September University	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University
	2	Biomedical Measurements and Instrumentations	Measurement Techniques	Basic analog electronics	Fundamentals of Biomechanics	Life sciences II (Cell Biology & Physiology)	Industrial Supervision	Medical Applications
	3	Statics	Electrical Skills (I)	Medical electrical measurements	Biochemistry and Biomaterials for Bioengineers	Engineering management and society	Project Scheduling	Atatürk's Principles And History Of Turkish Reforms
	4	Dynamics	Applied Mathematics for BMT (II)	Basic digital electronics	Engineering Professionalism	Multivariable calculus and partial differential equations	Technical Practicum	
	5	Principles of Marketing for medical devices and supplies	Introduction to Biomechanics	Biomedical mechanical Equipments	Systems Thinking and Dynamics	University Common Core Course	Student in University	
	6	Special Topics on Biomedical Engineering Technology	Principles of Mechanical Biomedical Instrumentation	Computer Programming	GE5			
	7	Operating System						
	8	Advanced Programming						
--		--	--	--	--	--	--	--
		Level 3						
Semester	**No**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**
1	1	Biomedical Electronics 1	Biomedical Electronics (III)	Medical analog signal processing	Industrial Attachment	Biomechanics for biomedical engineering	Electrical Principles	Microprocessor Applications
	2	Total Quality Management	Electrical Machines in Medical Instrumentation	Advanced Medical analog electronics	UE 1	Life sciences III (Physiology)	Electronics I	Industrial Electronics
	3	Biomedical Devices 1	Electrical Skills (II)	Advanced Medical digital electronics	Biomedical Engineering Design	Biomedical engineering laboratory	Network Systems	Laser and Medical Applications

University		21 September University	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University
	4	System Analysis and Design	Optical Biomedical Instrumentation	Electro Mechanical & pneumatic Equipment's	UE 1	Statistics and mathematical analysis for biomedical engineering	Circuit Analysis	Hospital Organization And Management
	5	Software Engineering	Biomaterials	Advanced Medical Mechanical Equipment's	UE 2	Technical English for biomedical engineering	Electronics II	Technical Elective
	6	Biomaterials	Mechanical Biomedical Instrumentation	University Elective	UE 3			
	7	Biomechanics	Medical Jurisprudence		Technical Elective 1			
	8							
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2	1	Biomedical Electronics 2	Biomedical Electronics (IV)	Medical Digital signal processing	Biomedical Engineering Design	Biomaterials science and engineering	Electronics-Digital Circuits	Medical Training
	2	Biomedical Devices 2	Introduction to Bioelectrical Instrumentation	Medical electronic Equipment's	UE 2	Medical imaging	Instrumentation and Process Control	Laboratory Support Equipment
	3	Biomedical signals processing	Hospital Safety	Imaging systems	UE 3	Integrated project	Microprocessors	Diagnosis and Tracking Devices
	4	Microcontroller and Microprocessor	Biomedical Imaging Equipment	Medical Equipment's management & maintenance	UE 4	Practical Chinese for engineering students	Digital Signal Processors	
	5	Artificial Organs and Extremities	Introduction to Bioengineering Design	University Elective	Technical Elective 1	Common Core Course	RF Fundamentals	
	6	Clinical Engineering	Audiology II	University Elective	Industrial Attachment	Professional training (Internship)		
	7	Research methodology	Expository Writing		UE 4			
	8							

University		21 September University	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University
		--	--	--	--	--	--	--
		Level 4						
Semester	**No**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**
1	1	Mobile Application Development	Biomedical Electronics (V)	Computer application for biomedical systems	Eng. Dissertation	Final year project	Biomedical Instrumentation I	
	2	Biomedical Devices Maintenance and Management 1	Biomedical Signal Processing	Advanced imaging systems	Technical Elective 2	Elective Course	Medical Imaging Equipment Technology	
	3	Special studies (Seminars and Case Study) in Biomedical Engineering Technology	Special Topics on Biomedical Instrumentation	Optical & laboratory medical Equipment's	Pathway Elective 1	Common Core Course	Anatomy and Physiology I	
	4	Artificial Intelligent	Control Systems in Biomedical Equipment	Advanced medical electronic Equipment's	UE 5	Control and instrumentation	Anatomy and Physiology Laboratory I	
	5	Rehabilitation Procedures	Automation in Clinical Laboratory	Elective specialty courses	UE 6	Biomedical instrumentation and systems	Anatomy and Physiology II	
	6	Project 1		University Elective				
	7							
	8							
		--	--	--	--	--	--	--
2	1	Project 2	Biomedical Electronics (VI)	Project	Eng. Dissertation	Final year project	Anatomy and Physiology Laboratory II	
	2	Biomedical Devices	Biomedical Computing	Digital image processing	Pathway Elective 2	Elective Course	Analytic Geometry and Differential	

University		21 September University	King Saud University	Majmaah University	National University of Singapore	The University of Hong Kong	East Tennessee State University	Eastern Mediterranean University
		Maintenance and Management 2					Calculus	
	3	Occupational Ethics For Engineers	Clinical Practice / Project	Control of biomedical systems	UE 7	Biomedical ultrasonics: principles and applications	Integral Calculus for Technology	
	4	Safety for Biomedical Engineering Technology Specialists	Maintenance Management	Safety in hospitals	UE8	Magnetic resonance imaging: principles, technology and applications		
	5	Machine Learning	Rehabilitation Procedures	Elective specialty courses		Biomedical signals processing and modeling in medical applications		
	6	Entrepreneurship	Basic Emergency Care	Elective specialty courses				
	7			University Elective				
	8							
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Biomedical Engineering Technology Program Specification

Annex- 19, Comparison of Program Courses and Similar Programs Courses

#	King Saud University					Majmaah University					National University of Singapore					The University of Hong Kong					East Tennessee State University					Eastern Mediterranean University					21 September University				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
Level 1																																			
1	English Language Skills	8				English Language	8				Materials Engineering Principles and Practice	4				Fundamental mechanics	6				Critical Reading and Expository Writing	3				Basic English I	3				English 101	2			
2	Introduction to Mathematics	2				Introduction to Mathematics 1	2				Design and Make4	4				Electricity and electronics	6				Critical Thinking and Argumentation	3				Mathematics for Electronic Technicians	3				Arabic 101	2			
3	Computer skills	3				Computer Skills	2				Engineering Calculus	2				Calculus and ordinary differential equations	6				Introduction to Communication Studies	3				Anatomy And Physiology	3				Islamic Culture	2			
4	Communication Skills	2				Communication Skills	2				Differential Equations for Engineering	2				Core University English	6				Literary Heritage	3				Electrotechnology	3				National Culture	2			
5						Introduction to chemistry	2				Biomedical Engineering Principles and	4				University Common Core Course	6				Art History Survey I	3				Introduction to Computing	3				Fundamentals of Nursing	2			

#	King Saud University					Majmaah University					National University of Singapore					The University of Hong Kong					East Tennessee State University					Eastern Mediterranean University					21 September University				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
											Practice I																								
6						Biophysics	2				GE 1	4														Properties of Electronic Materials	3				Medical Terminology	2			
7						Biology	2																								Math 1	3			
8																														Introduction to Biomedical Engineering Technology	2			
9																														Computer principles and programming	3			
1	Introduction to Organic Chemistry	2				Emergency care	2				Linear Algebra with Differential Equations	2				Fundamentals of chemistry and biology for biomedical engineering	6				Technology and Society	3				Basic English II	3				English 102	2			
2	General Physics	3				Anatomy for Bioengineering	2				Programming Methodology	4				Electricity and electronics	6				Introduction to Cultural Anthropology	3				Electronics - I	3				Arabic 102	2			

#	King Saud University					Majmaah University					National University of Singapore					The University of Hong Kong					East Tennessee State University					Eastern Mediterranean University					21 September University				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
3	Biology	3				Biomedical Physiology for Engineering	2				Critical Thinking & Writing	4				Computer programming I	6				Principles of Microeconomics	3				Digital Electronics	3				Arabic Israeli Conflict	2			
4	English for Medical Purposes	8				Basic mathematics	2				Physics IIE	4				Linear algebra, probability& statistics	6				The United States to 1877	3				Computer Applications	3				Principle of Health Management	2			
5	Biostatistics	2				Bio-Physics	2				Biomedical Engineering Principles and Practice II	4				University Common Core Course	6				The United States since 1877	3				Medical Instrumentation - I	3				Anatomy and Physiology	2			
6						Bio-mechanics	2				Quantitative Reasoning (GE 2)	4														Medical Communication	3				Communication skills and Presentation	2			
7						Faculty Elective	2																			Summer Practice	10				Math 2	3			
8						University Elective	2																								Programming 2	3			
9																														Physics	2			
1	Biomedical Electronics (I)	4				Applied Mathematics 1	2				Introduction to Machine Learning	4				Thermofluid mechanics	6				General Physics I-Noncalculus	3				Electronics II	3				Electrical Circuits 1	3			
2	Principles of Computing	2				Physics for medical Equipment's	3				Quantitative Physiology for Bioengineers	4				Engineering in biology and medicine	6				General Physics Laboratory I-Noncalculus	1				Microprocessors	3				Medical Statistics	3			

#	King Saud University					Majmaah University					National University of Singapore					The University of Hong Kong					East Tennessee State University					Eastern Mediterranean University					21 September University				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
3	BMT 222 Applied Mathematics for BMT (I)	2				MET 243 Electrical circuits	3				BN2403 Fundamentals of Biosignals Processing and Bioinstrumentation	4				Life sciences I (Biochemistry)	6				General Chemistry Lecture I	4				Medical Instrumentation II	3				General biology	2			
4	Basic Mechanical Skills	3				Electrical skills	2				Organic Chemistry for Engineers	4				Biomedical signals and linear systems	6				General Chemistry Laboratory I	0				Fault Analysis in Biomedical Systems	3				Math 3	3			
5	Applied Physics for BMT	4				Computer and systems	2				GE 3	4				University Common Core Course	6				Probability and Statistics – Noncalculus	3				Medical Imaging Systems	3				Digital Logic Design	3			
6	Rehabilitation Procedures	3				Bio-materials	2				GE4	4									CADD (Computer Aided Design Drafting)	4				Occupational Terminology	3				Object-Oriented Programming	2			
7						Faculty Elective	2																										Engineering Drawing	2			
8																																Computer Network	2			
1	Biomedical Electronics (II)	4				Applied Mathematics 2	2				Bioengineering Data Analysis	4				Engineering training	6				Technical Communication	3				Biomedical Signal Processing	3				Electrical Circuits 2	3			
2	Measurement Techniques	2				Basic analog electronics	3				Fundamentals of Biomechanics	4				Life sciences II (Cell Biology & Physiology)	6				Industrial Supervision	3				Medical Applications	3				Biomedical Measurements and	3			

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	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
																															Instrumentations				
3	Electrical Skills (I)	2				Medical electrical measurements	3				Biochemistry and Biomaterials for Bioengineers	4				Engineering management and society	6				Project Scheduling	3				Atatürk's Principles And History Of Turkish Reforms	2				Statics	2			
4	Applied Mathematics for BMT (II)	2				Basic digital electronics	3				Engineering Professionalism	2				Multivariable calculus and partial differential equations	6				Technical Practicum	4									Dynamics	2			
5	Introduction to Biomechanics	2				Biomedical mechanical Equipments	3				Systems Thinking and Dynamics	4				University Common Core Course	6				Student in University	2									Principles of Marketing for medical devices and supplies	2			
6	Principles of Mechanical Biomedical Instrumentation	3				Computer Programming	2				GE5	4																			Special Topics on Biomedical Engineering Technology	3			
7																															Operating System	2			

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	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
8																														Advanced Programming	2			
1	Biomedical Electronics (III)	3				Medical analog signal processing	2				Industrial Attachment	10				Biomechanics for biomedical engineering	6				Electrical Principles	4				Microprocessor Applications	3				Biomedical Electronics 1	3			
2	Electrical Machines in Medical Instrumentation	2				Advanced Medical analog electronics	3				UE 1	4				Life sciences III (Physiology)	6				Electronics I	4				Industrial Electronics	3				Total Quality Management	2			
3	Electrical Skills (II)	2				Advanced Medical digital electronics	3				Biomedical Engineering Design	6				Biomedical engineering laboratory	6				Network Systems	3				Laser and Medical Applications	3				Biomedical Devices 1	3			
4	Optical Biomedical Instrumentation	3				Electro Mechanical & pneumatic Equipment's	3				UE 1	4				Statistics and mathematical analysis for biomedical engineering	6				Circuit Analysis	3				Hospital Organization And Management	3				System Analysis and Design	3			
5	Biomaterials	2				Advanced Medical Mechanical Equipment's	3				UE 2	4				Technical English for biomedical engineering	6				Electronics II	4				Technical Elective	3				Software Engineering	2			
6	Mechanical Biomedical Instrumentation	3				University Elective	2				UE 3	4																		Biomaterials	2			

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	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
7	Medical Jurisprudence	2									Technical Elective 1	4																		Biomechanics	2			
1	Biomedical Electronics (IV)	3				Medical Digital signal processing	3				Biomedical Engineering Design	6				Biomaterials science and engineering	6				Electronics-Digital Circuits	4				Medical Training					Biomedical Electronics 2	3			
2	Introduction to Bioelectrical Instrumentation	2				Medical electronic Equipment's	3				UE 2	4				Medical imaging	6				Instrumentation and Process Control	4				Laboratory Support Equipment	3				Biomedical Devices 2	3			
3	Hospital Safety	2				Imaging systems	3				UE 3	4				Integrated project	6				Microprocessors	4				Diagnosis and Tracking Devices	3				Biomedical signals processing	3			
4	Biomedical Imaging Equipment	3				Medical Equipment's management & maintenance	2				UE 4	4				Practical Chinese for engineering students	6				Digital Signal Processors	4									Microcontroller and Microprocessor	3			
5	Introduction to Bioengineering Design	2				University Elective	2				Technical Elective 1	4				Common Core Course	6				RF Fundamentals	3									Artificial Organs and Extremities	2			
6	Audiology II	2				University Elective	2				Industrial Attachment	10				Professional training (Internship)															Clinical Engineering	3			

#	King Saud University					Majmaah University					National University of Singapore					The University of Hong Kong					East Tennessee State University					Eastern Mediterranean University					21 September University				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
7	Expository Writing	2									UE 4	4																		Research methodology	2			
1	Biomedical Electronics (V)	3				Computer application for biomedical systems	3				Eng. Dissertation	4				Final year project	6				Biomedical Instrumentation I	4								Mobile Application Development	3			
2	Biomedical Signal Processing	3				Advanced imaging systems	3				Technical Elective 2	4				Elective Course	6				Medical Imaging Equipment Technology	3								Biomedical Devices Maintenance and Management 1	3			
3	Special Topics on Biomedical Instrumentation	4				Optical & laboratory medical Equipment's	3				Pathway Elective 1	4				Common Core Course	6				Anatomy and Physiology I	4								Special studies (Seminars and Case Study) in Biomedical Engineering Technology	2			
4	Control Systems in Biomedical Equipment	2				Advanced medical electronic Equipment'	3				UE 5	4				Control and instrumentation	6				Anatomy and Physiology Laboratory I	0								Artificial Intelligent	2			

#	King Saud University					Majmaah University					National University of Singapore					The University of Hong Kong					East Tennessee State University					Eastern Mediterranean University					21 September University				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
						s																													
5	Automation in Clinical Laboratory	3				Elective specialty courses	2				UE 6	4				Biomedical instrumentation and systems	6				Anatomy and Physiology II	4									Rehabilitation Procedures	2			
6						University Elective	2																									Project 1	2			
1	Biomedical Electronics (VI)	3				Project	2				Eng. Dissertation	4				Final year project	6				Anatomy and Physiology Laboratory II	0									Project 2	3			
2	Biomedical Computing	4				Digital image processing	2				Pathway Elective 2	4				Elective Course	6				- Analytic Geometry and Differential Calculus	3									Biomedical Devices Maintenance and Management 2	3			
3	Clinical Practice / Project	3				Control of biomedical systems	3				UE 7	4				Biomedical ultrasonics: principles and applications	6				- Integral Calculus for Technology	3									Occupational Ethics For Engineers	2			
4	Maintenance Management	2				Safety in hospitals	2				UE8	4				Magnetic resonance imaging: principles, technology and applications	6														Safety for Biomedical Engineering Technology Specialists	2			

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		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
5	Rehabilitation Procedures	2				Elective specialty courses	2									Biomedical signals processing and modeling in medical applications	6														Machine Learning	2			
6	Basic Emergency Care	2				Elective specialty courses	2																								Entrepreneurship	2			
7						University Elective	2																												

Biomedical Engineering Technology Program Specification

Annex- 20, Matrix of Mapping Program PILO's with Courses

I =Introduction; E=Extension; A=Application

#	Year المستوى الدراسي	Term الفصل الدراسي	Course Name اسم المقرر	Course Code رمز المقرر	Credit Hours الساعات المعتمدة				Program Intended Learning Outcomes (PILOs) رمز ورقم مخرجات التعلم											
									A. Knowledge and understanding المعرفة والفهم				B. Intellectual Skills المهارات الذهنية				C. Practical & Professional Skills المهارات العملية				D. Transferrable Skills المهارات الانتقالية			
					L	T	P	Total	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
1	1	1	English 101	06.11.703	2			2	√		√	√	√	√			√				√	√	√	
2	1	1	Arabic 101	06.11.701	2			2	√				√	√			√				√	√	√	
3	1	1	Islamic Culture	06.11.705	2			2									√				√	√		
4	1	1	National Culture	06.11.706	2			2									√				√	√		
5	1	1	Fundamentals of Nursing	04.01.701	2			2			√						√				√	√		√
6	1	1	Medical Terminology	04.02.702	2			2	√	√	√	√	√			√	√	√			√			√
7	1	1	Math 1	07.02.711	2			2	√	√		√	√				√				√			
8	1	2	Introduction to Biomedical Engineering Technology	07.02.724	2			2	√	√	√	√	√	√	√		√			√				

9	1	1	Computer Fundamentals and programming	07.01.743	2		**2**	3	√	√	√	√	√			√	√			√	√		√	√
10	1	2	English 102	06.11.704	2			2	√		√		√	√		√	√	√		√	√		√	√
11	1	2	Arabic 102	06.11.702	2			2	√				√	√		√	√				√	√	√	
12	1	2	Arabic Israeli Conflict	06.11.707	2			2														√		
13	1	2	Principle of Health Management	05.01.703	2			2	√			√		√		√					√	√	√	√
14	1	2	Anatomy and Physiology	01.01.704	2			2	√		√		√				√	√						
15	1	2	Communication skills and Presentation	05.01.705	2			2	√			√	√	√	√						√	√		√
16	1	2	Math 2	07.02.712	2		2	3	√	√		√	√	√		√	√	√			√			√
17	1	2	Programming 2	07.01.744	2		2	3	√	√	√	√		√	√		√	√	√		√			√
18	1	2	Physics	07.02.714	2			2	√	√		√	√	√		√	√							√
19	2	1	Electrical Circuits 1	07.02.718	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√			
20	2	1	Medical Statistics	05.02.706	2		2	3	√	√		√	√	√		√	√	√			√			√
21	2	1	General biology	03.01.707	2		2	2	√	√		√					√				√			√
22	2	1	Math 3	07.02.713	2		2	3	√	√		√	√	√	√	√		√	√		√			√
23	2	1	Digital Logic Design	07.02.720	2		2	3	√	√						√		√	√	√	√			
24	2	1	Object-Oriented Programming	07.01.745	2			2	√	√	√	√					√	√						√

25	2	1	Engineering Drawing	07.02.715	1		2	2	√				√					√	√	√				√
26	2	1	Computer Network	07.01.746	2			2	√	√	√	√	√		√		√		√	√	√			√
27	2	2	Electrical Circuits 2	07.02.719	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√			√
28	2	2	Biomedical Measurements and Instrumentations	07.02.725	2		2	3	√	√	√	√	√	√	√		√	√	√	√	√			√
29	2	2	Statics	07.02.716	2			2	√			√	√		√		√			√	√			
30	2	2	Dynamics	07.02.717	2			2	√	√	√	√	√				√				√			
31	2	2	Principles of Marketing for medical devices and supplies	05.01.708	2			2	√	√		√		√							√	√	√	√
32	2	2	Special Topics on Biomedical Engineering Technology	07.02.726	2		2	3	√	√	√	√	√	√	√	√	√	√		√	√			√
33	2	2	Operating System	07.01.747	2			2	√	√	√	√	√	√		√		√	√		√			√
34	2	2	Advanced Programming	07.01.748	2			2	√	√	√	√		√	√			√	√	√	√		√	√
35	3	1	Biomedical Electronics 1	07.02.721	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√			
36	3	1	Total Quality Management	05.01.709	2			2	√							√				√	√	√	√	√
37	3	1	Biomedical Devices 1	07.02.729	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√			√
38	3	1	System Analysis and Design	07.01.749	2		2	3	√	√	√	√	√	√	√			√	√	√	√			√

39	3	1	Software Engineering	07.01.750	2			2	√	√	√	√	√		√	√	√	√	√	√			√
40	3	1	Biomaterials	07.02.727	2			2	√			√		√				√			√			√
41	3	1	Biomechanics	07.02.728	2			2	√	√	√	√	√	√			√	√			√			√
42	3	2	Biomedical Electronics 2	07.02.722	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√			√
43	3	2	Biomedical Devices 2	07.02.730	2		2	3	√	√	√	√	√	√	√		√	√		√	√			√
44	3	2	Biomedical signals processing	07.02.732	2		2	3	√	√		√	√	√						√	√			√
45	3	2	Microcontroller and Microprocessor	07.02.723	2		2	3	√	√		√			√		√	√		√	√			√
46	3	2	Artificial Organs and Extremities	07.02.733	2			2	√	√	√	√					√	√		√	√			√
47	3	2	Clinical Engineering	07.02.735	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√
48	3	2	Research methodology	05.02.710	2			2	√	√	√		√	√	√	√		√	√	√	√	√		√
49	4	1	Mobile Application Development	07.01.751	2		2	3		√	√	√						√	√	√	√			√
50	4	1	Biomedical Devices Maintenance and Management 1	07.02.736	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√
51	4	1	Special studies (Seminars and Case Study) in Biomedical Engineering Technology	07.02.731			4	2	√		√	√		√			√				√	√		

52	4	1	Artificial Intelligent	07.01.752	2			2	√	√	√	√	√						√		√			√
53	4	1	Rehabilitation Procedures	07.02.734	2			2	√	√	√	√						√			√			√	
54	4	1	Project 1	07.02.740	2			2	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
55	4	2	Project 2	07.02.741	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
56	4	2	Biomedical Devices Maintenance and Management 2	07.02.737	2		2	3	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
57	4	2	Occupational Ethics For Engineers	07.02.739	2			2	√				√	√		√			√		√	√	√	√	√
58	4	2	Safety for Biomedical Engineering Technology Specialists	07.02.738	2			2	√	√	√	√	√		√	√	√	√	√	√	√	√	√			√
59	4	2	Machine Learning	07.01.753	2			2	√	√	√	√						√	√		√			√	
60	4	2	Entrepreneurship	05.01.711	2			2	√			√	√	√		√	√				√	√	√		

Program Intended Learning Outcomes (PILOs): Current Program Biomedical Engineering Technology Program at 21 September University - for Medical and Applied Sciences

A. Knowledge and Understanding:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

A1 Demonstrate an understanding of appropriate models, theories, mathematical foundations, and techniques related to biomedical engineering technology disciplines.

A2 Demonstrate a profound knowledge in maintenance, troubleshooting, tools, techniques, practices, and methods, utilizing and adapting biomedical engineering technology for solving biomedical devices and equipment's problems in health environment.

A3 Identify user and healthcare needs to provide biomedical engineering technology maintenance based solutions to real-world problem.

A4 Demonstrate a sound understanding the biomedical engineering technology concept related to maintenance, troubleshooting, programming, utilizing, analysis, design, implementation, and evaluation of biomedical equipment's, devices and systems.

B. Cognitive/ Intellectual Skills:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

B1. Critically analyze complex biomedical devices and equipment's problems, faults and propose appropriate biomedical devices maintenance based solutions and integrate them effectively into the uses and healthcare organizations.

B2. Analyze the impacts of biomedical devices and equipment's problems and faults on health objectives, customer needs and consider them during the purchasing, maintenance, selection, integration, configuration and administration of biomedical devices, equipment's and systems.

B3. Explore variety of challenges and problems related to maintenance, troubleshooting and performance of biomedical devices to select the optimal solution.

B4. Evaluate biomedical engineering based solution to meet a given set of health requirements in the context of biomedical engineering technology discipline.

C. Practical and Professional Skills:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

C1. Employ effectively the biomedical engineering technology concepts, principles of engineering, maintenance and evaluation tools and techniques used for the analysis and troubleshooting of medical devices faults of varying complexity.

C2. Design, implement, and test of biomedical devices and equipment's maintenance based solution to meet a given set of engineering requirement in the context of biomedical engineering technology.

C3. Use systematic approaches to maintenance, select, develop and administrate biomedical devices and equipment's to accomplish user and health goals.

C4. Use the techniques, skills, and necessary tools for biomedical engineering practices.

D. General and Transferable Skills:

Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:

D1. Function effectively as an individual, as a member, or leader of a team engaged in appropriate activities to the biomedical engineering technology disciplines to accomplish a common goal.

D2. Commit to professional ethics, responsibilities, and norms of professional biomedical engineering practices.

D3. Communicate effectively in writing and orally in a variety of professional contexts.

D4. Engage in continuing professional development and lifelong learning as an biomedical engineering technology professional.

Annex- 21, CVs for the Preparation Committee

Attached separately.

Approved by

Department Head	Faculty Dean	Quality Unit	Vice President