SETHU INSTITUTE OF TECHNOLOGY

PULLOOR, KARIAPATTI – 626115

(An Autonomous Institution

Affiliated to Anna University Chennai)

B.E. BIOMEDICAL ENGINEERING

CURRICULUM & SYLLABUS

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

(Applicable to candidates admitted in the Academic Year 2019 - 2020)

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Chairman
Board of Studies

Chairperson
Board of Studies
Bio Medical Engineering
Sethu Institute of Technology
Kariapatti - 626 115.

Chairman
Academic Council

CHAIRMAN
ACADEMIC COUNCIL
Sethu Institute of Technology
Pulloor, Kariapatti - 625 115

PROGRAMME: B.E. BIOMEDICAL ENGINEERING

VISION

To provide high quality technical education and to become a Centre of Excellence in education and research in Biomedical Engineering ensuring quality healthcare services.

MISSION

- Providing quality technical education to enable the students to meet the industrial needs.
- Adapting innovative teaching methodologies to produce competent technocrats.
- Facilitating the students towards employability and entrepreneurship.
- Promoting Industry Institute Interaction to enable new technologies.
- Enriching the student's technical competence in research and development.
- Serving the society by conducting research to improve health care services.

PROGRAMME EDUCATIONAL OBJECTIVES:

Our graduates will

PEO-1: Demonstrate their skills in solving challenges in health care by the knowledge acquired in engineering. **(Technical Competence)**

PEO-2: Exhibit leadership; make decisions with societal and ethical responsibilities effectively in multidisciplinary settings. **(Life-Long Learning)**

PEO-3: Recognize the need for sustaining and expanding their technical competence throughout their careers. **(Professionalism)**

PROGRAMME OUTCOMES:

The graduates of Biomedical Engineering Program will have an ability to:

PO-1: Apply knowledge of basic science, Biomedical, Mathematics and Engineering to solve the solution of complex engineering problems. **(Engineering knowledge)**

PO-2: Identify, formulate and analyze complex problems in the field of biomedical engineering using principles of mathematics, natural, biological and engineering sciences. **(Problem Analysis)**

PO-3: Design components, systems, or processes to meet the medical and health care needs within realistic constraints of economic, safety, cultural, societal, ethical and environmental considerations. **(Design and Development of Solutions)**

PO-4: Use research-based knowledge and research methods including design of medical equipments, analysis and interpretation of medical data, and synthesis of the information to provide valid conclusions. **(Conduct investigations of complex problems)**

PO-5: Use the techniques and skills to develop products such as artificial organs, prostheses medical information system that solve medical and health related problems by combining their knowledge of biology and medicine with engineering principles and practices. **(Modern Engineering Tools)**.

PO-6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the biomedical engineering practice. **(Engineer and Society)**.

PO-7: Understand the impact of the biomedical engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. **(Environment and sustainability)**

PO-8: Apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice. **(Ethics)**

PO-9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **(Individual and Team Work)**.

PO-10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. **(Communication)**.

PO-11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **(Project Management and Finance)**

PO-12: Recognize the need for, and prepare to engage in independent and life-long learning in the broadest context of technological change and contemporary issues. **(Life-long learning)**

PROGRAMME SPECIFIC OUTCOMES:

PSO-1: Analyze, design and develop the systems to supplement and / or assist human healthcare.

PSO-2: Develop the mathematical model to understand the inter-relation among various Physiological systems.

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(An Autonomous Institution)

B.E. Degree Programme

CHOICE BASED CREDIT SYSTEM

CURRICULUM

Regulation 2019

Bachelor of Engineering in Biomedical Engineering

OVERALL COURSE STRUCTURE

S.No.	Course Category	Total No. of Courses	Credits	Percentage
1	Humanities and Social Sciences (HS)	7	13.5	7.63 %
2	Basic Science courses (BS)	9	27.5	15.54 %
3	Engineering Science courses (ES)	8	21	11.86 %
4	Professional Core courses (PC)	28	70	39.55 %
5	Professional Elective (PE)	6	18	10.17 %
6	Open Elective (OE)	4	12	6.78 %
7	Project work (P)	5	15	8.47 %
8	Mandatory Courses (MC)	5	--	--
TOTAL		72	177	100

COURSE CREDITS - SEMESTER WISE

Branch	I	II	III	IV	V	VI	VII	VIII	TOTAL
BME	23	20.5	22	25.5	25.5	25	21.5	14	177

Employability Courses

Skill Development Courses

Entrepreneurship Development Courses

Any two or all of the above

SEMESTER I

S.No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY							
1.	19UEN101	English for Technical Communication (Common to ALL Branches)	HS	2	0	0	2
2.	19UMA102	Engineering Mathematics – I (Common to ALL Branches)	BS	3	1	0	4
3.	19UPH103	Engineering Physics (Common to ALL Branches)	BS	3	0	0	3
4.	19UCY105	Applied Chemistry (Common to ECE, EEE, CSE, IT, BME & BT)	BS	3	0	0	3
5.	19UCS108	Problem Solving and Python Programming (Common to ALL Branches)	ES	3	0	0	3
6.	19UME109	Engineering Graphics (Common to ALL Branches)	ES	3	1	0	4
PRACTICAL							
7.	19UCS110	Problem Solving and Python Programming Laboratory (Common to ALL Branches)	ES	0	0	3	1.5
8.	19UCS112	Engineering Fundamentals Laboratory (Common to ECE, CSE, IT, BME & BT)	ES	0	0	3	1.5
9.	19UGS113	Basic Sciences Laboratory (Common to ALL Branches)	BS	0	0	2	1
MANDATORY							
10.	19UGM131	Induction Program (Common to ALL Branches)	MC	0	3	0	P/F
			Total	17	5	8	23
Total Credits : 23							

SEMESTER II

S.No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY							
1.	19UEN201	Communication Skills for Professionals (Common to ALL Branches)	HS	1	0	1	1.5
2.	19UMA207	Calculus, Complex Analysis and Transform Techniques (Common to AGRI, CHE, BME &BT)	BS	3	1	0	4
3.	19UPH204	Biomaterial Physics (Common to BME & BT)	BS	3	0	0	3
4.	19UCY204	Environmental Science (Common to ALL Branches)	HS	3	0	0	3
5.	19UBM205	Introduction to Biomedical Engineering	ES	3	0	0	3
6.	19UBM206	Electrical Circuits and Measurements	ES	3	0	0	3
PRACTICAL							
7.	19UGS210	Energy and Environmental Science Laboratory (Common to ALL Branches)	BS	0	0	3	1.5
8.	19UBM211	Electrical Circuits Laboratory	ES	0	0	3	1.5
			Total	16	1	7	20.5
Total Credits : 20.5							

SEMESTER III

S.No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY							
1.	19UMA326	Transform Techniques and PartialDifferential Equations (Common to AGRI, CHE & BME)	BS	3	1	0	4
2.	19UBM302	Human Anatomy and Physiology	PC	3	0	0	3
3.	19UBM303	Biochemistry	PC	3	0	0	3
4.	19UBM304	Biomedical Instrumentation	PC	3	0	0	3
5.	19UBM305	Semiconductor Devices and Circuits	PC	3	0	0	3
6.	19UBM306	Sensors and Measuring Techniques	PC	3	0	0	3
PRACTICAL							
7.	19UBM307	Semiconductor Devices and CircuitsLaboratory	PC	0	0	3	1.5
8.	19UBM308	Biochemistry and Human Physiology Laboratory	PC	0	0	3	1.5
MANDATORY							
9.	19UGM331	Biology for Engineers (Common to BME & BT)	MC	2	0	0	P/F
			Total	20	1	6	22
Total Credits : 22							

SEMESTER IV

S.No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY							
1.	19UMA424	Probability and Inferential Statistics	BS	3	1	0	4
2.	19UBM402	Analog and Digital Integrated Circuits	PC	4	0	0	4
3.	19UBM403	Medical Physics	PC	3	0	0	3
4.	19UBM404	Principles of Signals and Systems	PC	3	0	0	3
5.	19UBM405	Pathology and Microbiology	PC	3	0	0	3
6.	19UBM406	Diagnostic and Therapeutic Equipments – I	PC	3	0	0	3
PRACTICAL							
7.	19UBM407	Analog and Digital Integrated Circuits Laboratory	PC	0	0	3	1.5
8.	19UBM408	Sensors and Biomedical Instrumentation Laboratory	PC	0	0	3	1.5
9.	19UBM409	Pathology and Microbiology Laboratory	PC	0	0	3	1.5
10.	19UBM410	Technical Seminar	P	0	0	2	1
MANDATORY							
11.	19UGM431	Gender Equality	MC	1	0	0	P/F
			Total	20	1	11	25.5
Total Credits : 25.5							

SEMESTER V

S.No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY							
1.	19UBM501	Microprocessors and Microcontrollers	PC	3	0	0	3
2.	19UBM502	Diagnostic and Therapeutic Equipments - II	PC	3	0	0	3
3.	19UBM503	Bio Control System	PC	3	1	0	4
4.	13UBM504	Principles of Digital Signal Processing	PC	3	0	0	3
5.	PE - I	Professional Elective – I	PE	3	0	0	3
6.	OE - I	Open Elective – I	OE	3	0	0	3
PRACTICAL							
7.	19UBM507	Creative Thinking and Innovation	P	0	0	2	1
8.	19UBM508	Microprocessors and microcontrollers Laboratory	PC	0	0	3	1.5
9.	19UBM509	Diagnostic and Therapeutic Equipments Laboratory	PC	0	0	3	1.5
10.	19UBM510	Signal Processing Laboratory	PC	0	0	2	1
11.	19UGS533	Interpersonal Skills Laboratory	HS	0	0	3	1.5
			Total	18	1	13	25.5
Total Credits : 25.5							

SEMESTER VI

S.No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY							
1.	19UBM601	Medical Imaging Equipments	PC	3	0	0	3
2.	19UBM602	Biomechanics	PC	3	0	0	3
3.	19UIT623	Object Oriented Programming and Data Structures	ES	2	0	3	3.5
4.	PE - II	Professional Elective – II	PE	3	0	0	3
5.	PE - III	Professional Elective – III	PE	3	0	0	3
6.	OE - II	Open Elective – II	OE	3	0	0	3
PRACTICAL							
7.	19UBM607	Product Development Project	P	0	0	8	4
8.	19UGS631	Logical Reasoning and Aptitude	HS	1	0	0	1
9.	19UGS632	Soft skills and Communication Laboratory	HS	0	0	3	1.5
MANDATORY							
10.	19UGM632	Indian Constitution and Essence of Indian Traditional Knowledge (Common to BME, CSE, ECE & IT)	MC	1	0	0	P/F
			Total	19	0	14	25
Total Credits : 25							

SEMESTER VII

S.No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY							
1.	19UME701	Project Management and Finance	HS	3	0	0	3
2.	19UBM702	Hospital Management	PC	3	0	0	3
3.	19UBM703	Image Processing Techniques	PC	3	0	0	3
4.	PE - IV	Professional Elective – IV	PE	3	0	0	3
5.	PE - V	Professional Elective – V	PE	3	0	0	3
6.	OE - III	Open Elective – III	OE	3	0	0	3
PRACTICAL							
7.	19UBM707	Summer Internship	P	0	0	0	1
8.	19UBM708	Hospital Training	PC	0	0	2	1
9.	19UBM709	Image Processing Laboratory	PC	0	0	3	1.5
MANDATORY							
10.	19UGM731	Professional Ethics and Human Values	MC	2	0	0	P/F
			Total	20	0	5	21.5
Total Credits : 21.5							

SEMESTER VIII

S.No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY							
1.	PE - VI	Professional Elective – VI	PE	3	0	0	3
2.	OE - IV	Open Elective – IV	OE	3	0	0	3
PRACTICAL							
3.	19UBM801	Project work	P	0	0	16	8
			Total	6	0	16	14
Total Credits : 14							

LIST OF PROFESSIONAL ELECTIVES

S.No.	Course Code	Course Title	L	T	P	C
1.	19UBM901	Bio-MEMS and Nano Electronics	3	0	0	3
2.	19UBM902	Clinical Engineering	3	0	0	3
3.	19UBM903	Principles of Tissue Engineering	3	0	0	3
4.	19UBM904	Biomaterials and Artificial Organs	3	0	0	3
5.	19UBM905	Pattern Recognition and Neural Networks	3	0	0	3
6.	19UBM906	Forensic Science	3	0	0	3
7.	19UBM907	Drug Delivery Systems	3	0	0	3
8.	19UBM908	Nuclear Medicine	3	0	0	3
9.	19UBM909	Medical Radiation Safety Engineering	3	0	0	3
10.	19UBM910	Medical Technology	3	0	0	3
11.	19UBM911	Medical Optics	3	0	0	3
12.	19UBM912	Genetic Engineering	3	0	0	3
13.	19UBM913	Communication Engineering	2	0	2	3
14.	19UBM914	Biometric Systems	3	0	0	3
15.	19UBM915	Medical Informatics	3	0	0	3
16.	19UBM916	Telemedicine	3	0	0	3
17.	19UBM917	Rehabilitation Engineering and Robotics	3	0	0	3
18.	19UBM918	Virtual Bio-Instrumentation	2	0	2	3
19.	19UBM919	Medical Embedded Systems	3	0	0	3
20.	19UBM920	Brain Computer Interface and virtual reality	3	0	0	3
21.	19UBM921	Neuroscience	3	0	0	3
22.	19UBM922	Cancer Biology	3	0	0	3
23.	19UBM923	Human Assist Devices	3	0	0	3
24.	19UBM924	Body Area Networks and Mobile Healthcare	3	0	0	3
25.	19UBM925	Regenerative Medicine and Ergonomics	3	0	0	3
26.	19UBM926	Physiological Modeling	2	0	2	3
27.	19UBM927	Big Data and IOT in Medical Applications	3	0	0	3
28.	19UBM928	VLSI System Design	3	0	0	3
29.	19UBM929	Medical Waste management	3	0	0	3
30.	19UBM930	Digital System Design	3	0	0	3
31.	19UBM931	Bio-Signal Processing	3	0	0	3
32.	19UBM932	Principles of Machine Learning	3	0	0	3
33.	19UBM933	Bio Statistics	3	0	0	3
34.	19UBM934	Electro Magnetic Interference and Compatibility	3	0	0	3
35.	19UBM935	Smart Healthcare Engineering and Artificial Intelligence	3	0	0	3

LIST OF OPEN ELECTIVES

S.No.	Course Code	Course Title	L	T	P	C
1.	19UBM971	Biomedical Instrumentation Systems	3	0	0	3
2.	19UBM972	Computer Applications in Medicine	3	0	0	3
3.	19UBM973	Forensic Science in Health Care	3	0	0	3
4.	19UBM974	Radiotherapy and Nuclear Medicine	3	0	0	3
5.	19UBM975	Occupational Safety and Health in Public Health Emergencies	3	0	0	3

LIST OF INTER-DISCIPLINARY COURSES

S.No.	Course Code	Course Title	L	T	P	C
1.	19UGM951	Electrical Hazards and Safety In Hospitals	3	0	0	3
2.	19UGM952	Bio-Fluid Mechanics	3	0	0	3

LIST OF ONE CREDIT COURSES

S.No.	Course Code	Course Title	L	T	P	C
1.	19UBM861	Fundamentals of MATLAB Programming	0	0	2	1
2.	19UBM862	Python Programming	0	0	2	1
3.	19UBM863	Virtual Learning of Anatomy and Physiology	0	0	2	1
4.	19UBM864	DICOM Introduction and Interpretation	0	0	2	1
5.	19UBM865	Multi Medical Equipments Operating Skills Laboratory	0	0	2	1
6.	19UBM866	Medical Science	0	0	2	1
7.	19UBM867	3D Printing applicable to Medical Field	0	0	2	1
8.	19UBM868	Occupational Emergency Care	0	0	2	1
9.	19UBM869	Intellectual Property Rights	1	0	0	1
10.	19UBM870	Entrepreneurship in Biomedical Engineering	1	0	0	1
11.	19UBM871	Troubleshooting and Quality Control in Medical Equipments	0	0	2	1
12.	19UBM872	Regulation Perspective of Medical Research	1	0	0	1
13.	19UBM873	Introduction to Fuzzy Logic and Genetic Algorithms	1	0	0	1
14.	19UBM874	Numerical methods for Biomedical Engineers	1	0	0	1
15.	19UBM875	Introduction to International Medical Data Banks	1	0	0	1
16.	19UBM876	Role of Biomedical Engineers in Disaster Management	1	0	0	1
17.	19UBM877	Medical Coding and Transcription	0	0	2	1
18.	19UBM878	Calibration and Testing of Medical Equipments	0	0	2	1