



**ADAMAS UNIVERSITY**  
**SCHOOL OF ENGINEERING & TECHNOLOGY**

**B.Tech. Biomedical Engineering**  
**Course Structure**

**Academic Year 2024 - 25**

**ADAMAS UNIVERSITY, KOLKATA  
SCHOOL OF ENGINEERING & TECHNOLOGY  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**VISION OF THE UNIVERSITY**

**To be an internationally recognized university through excellence in inter-disciplinary education, research and innovation, preparing socially responsible well-grounded individuals contributing to nation building.**

**MISSION STATEMENTS OF THE UNIVERSITY**

**M.S 01:** Improve employability through futuristic curriculum and progressive pedagogy with cutting-edge technology

**M.S 02:** Foster outcomes-based education system for continuous improvement in education, research and all allied activities

**M.S 03:** Install the notion of lifelong learning through culture of research and innovation

**M.S 04:** Collaborate with industries, research centers and professional bodies to stay relevant and up-to-date

**M.S 05:** Inculcate ethical principles and develop understanding of environmental and social realities

**CHANCELLOR / VICE CHANCELLOR**

**ADAMAS UNIVERSITY, KOLKATA**  
**SCHOOL OF ENGINEERING & TECHNOLOGY**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**VISION OF THE SCHOOL**

To develop well-grounded, socially responsible engineers and technocrats in a way to create a transformative impact on Indian society through continual innovation in education, research, creativity and entrepreneurship.

**MISSION STATEMENTS OF THE SCHOOL**

**M.S 01:** Build a transformative educational experience through disciplinary and inter-disciplinary knowledge, problem solving, communication and leadership skills.

**M.S 02:** Develop a collaborative environment open to the free exchange of ideas, where research, creativity, innovation and entrepreneurship can flourish among individual students.

**M.S 03:** Impact society in a transformative way – regionally and nationally - by engaging with partners outside the borders of the university campus.

**M.S 04:** Promote outreach programs which strives to inculcate ethical standards and good character in the minds of young professionals.

**DEAN / SOET**

**ADAMAS UNIVERSITY, KOLKATA  
SCHOOL OF ENGINEERING & TECHNOLOGY  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**VISION OF THE DEPARTMENT**

Provide holistic education and research environment for achieving excellence in the field of Biomedical Engineering research and development

**MISSION STATEMENTS OF THE DEPARTMENT**

**M.S 01:** Offer well-crafted interdisciplinary curriculum of Biomedical Engineering blended with futuristic and innovative pedagogy to provide strong foundation of knowledge and competent skills.

**M.S 02:** Impart skills and ethics for developing both professional and societal responsibilities.

**M.S 03:** Inculcate application-oriented skill sets conducting extensive training and research projects through multidisciplinary collaboration at both academia and industry level.

**M.S 04:** Foster design-thinking to create translatable solutions for human health and for development of health care technologies.

**M.S 05:** Nurture new ideas towards the self-reliance and entrepreneurship development.

**HOD**

**DEAN/SOET**

**ADAMAS UNIVERSITY, KOLKATA  
SCHOOL OF ENGINEERING & TECHNOLOGY  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Name of the Programme: B.Tech. Biomedical Engineering**

**PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

- PEO1:** Biomedical engineering graduates will be able to apply knowledge and innovative ideas in the interdisciplinary domains ranging from engineering, instrumentation to material science in both professional and entrepreneur career.
- PEO2:** Biomedical engineering graduates will develop effective communication, decision making, problem solving and creative skills and will be able to apply in the development of both professional and entrepreneur career.
- PEO3:** Biomedical engineering graduates will practice the ethical responsibilities and safely guidelines wherever applicable.

**HOD**

**DEAN / SCHOOL CONCERNED**

**ADAMAS UNIVERSITY, KOLKATA**  
**SCHOOL OF ENGINEERING & TECHNOLOGY**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Name of the Programme: B.Tech. BIOMEDICAL ENGINEERING**  
**GRADUATE ATTRIBUTE / PROGRAMME OUTCOME (PO)**

- PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.
- PO2: Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
- PO10: Communication:** 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.
- PO11: Project management and finance:** 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.
- PO12: Life-long learning:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**HOD**

**DEAN / SCHOOL CONCERNED**

**ADAMAS UNIVERSITY, KOLKATA  
SCHOOL OF ENGINEERING & TECHNOLOGY  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Name of the Programme: B.Tech. BIOMEDICAL ENGINEERING  
PROGRAMME SPECIFIC OUTCOME (PSO)**

**PSO1.** Understand the basic concepts of all the sub-domains of Biomedical Engineering.

**PSO2.** Analyze the results and problems related to the health care sectors

**PSO3.** Apply and disseminate the knowledge in designing and development of biomedical instruments and health care solutions

**HOD  
CONCERNED**

**DEAN / SCHOOL**

**ADAMAS UNIVERSITY  
SCHOOL OF ENGINEERING & TECHNOLOGY  
DEPARTMENT OF ELECTRONICS AND COMMUNICATION  
ENGINEERING  
B. Tech Biomedical Engineering  
Course Structure for AY 2024-2025**

**FIRST YEAR**



SEMESTER I								
S. No	Type	Course Code	Course Title	L	T	P	Contact Hrs/wk	Credits
1	Theory (BSC)	MTH11501	Engineering Mathematics-I	3	1	0	4	4
2	Theory (BSC)	PHY11201	Applied Science	2	0	0	2	2
3	Theory (ESC)	CSE11001	Introduction to Programming	2	0	0	2	2
		GEE11001	Electrical and Electronics Technology					
4	Theory (HSSM)	ENG11053	English Communication	1	0	2	3	2
	Theory	GEE11012	Disruptive Technology Innovations					
5	Theory (BSC)	BIT11003	Life Sciences	2	0	0	2	2
6	Theory (Mandatory)	DGS11002	Design Thinking & Prototyping	2	0	2	3	3
	Theory (ESC)	MEE11002	Engineering Mechanics		1	0		
7	Practical (BSC)	PHY12202	Applied Science Lab	0	0	4	4	2
8	Practical (ESC)	CSE12002	Programming Lab	0	0	4	4	2
		GEE12002	Electrical and Electronics Technology Lab					
9	Practical (ESC)	CEE12001	Engineering Drawing and CAD	0	0	4	4	2
		MEE12001	Engineering Workshop					
<b>Total</b>				<b>12</b>	<b>1/2</b>	<b>16/14</b>	<b>28</b>	<b>20</b>

SEMESTER II								
S. No	Type	Course Code	Course Title	L	T	P	Contact Hrs/wk	Credits
1.	Theory (BSC)	MTH11502	Engineering Mathematics– II	3	1	0	4	4
2.	Theory (ESC)	MEE11002	Engineering Mechanics	2	1	0	3	3
	Theory (Mandatory)	DGS11002	Design Thinking & Prototyping		0	2		
3.	Theory (BSC)	EVS11112	Environmental Science	2	0	0	2	2
4.	Theory (ESC)	GEE11001	Electrical and Electronics Technology	2	0	0	2	2
		CSE11001	Introduction to Programming					
5.	Theory	GEE11012	Disruptive Technology Innovations	1	0	2	3	2
	Theory (HSSM)	ENG11053	English Communication					
6.	Theory (Mandatory)	EIC11001	Venture Ideation	2	0	0	2	2
7.	Practical (ESC)	GEE12002	Electrical and Electronics Technology Lab	0	0	4	4	2
		CSE12002	Programming Lab					
8	Practical (ESC)	MEE12001	Engineering Workshop	0	0	4	4	2
		CEE12001	Engineering Drawing and CAD					
<b>Total</b>				<b>12</b>	<b>1/2</b>	<b>10/12</b>	<b>24</b>	<b>20</b>

**Total Credits (First Year): 40**

**SECOND YEAR**

<b>Semester-III</b>								
<b>S. No</b>	<b>Type</b>	<b>Course Code</b>	<b>Subject Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Contact Hrs/wk</b>	<b>Credits</b>
1.	Theory (BSC)	MTH11526	Engineering Mathematics – III (Transform Calculus & Special functions)	3	1	0	4	4
2.	Practical (ESC)	BME12004	MATLAB & Simulink	0	0	4	4	2
3.	Theory (PCC)	BME11001	Prof. Core – I (Analog and Digital Electronics)	3	1	0	4	4
4.	Theory (PCC)	BME11002	Prof. Core – II (Anatomy & Physiology)	3	1	0	4	4
5.	Theory (PCC)	BME11003	Prof. Core – III (Signals and Network Analysis)	3	1	0	4	4
6.	Practical (PCC)	BME12005	Prof. Core Lab – I (Signals and Network Analysis Lab)	0	0	2	2	1
7.	Practical (PCC)	BME12006	Prof. Core Lab – II (Electronics Lab)	0	0	2	2	1
8.	Practical (BSC)	MTH12531	Numerical Techniques Lab	0	0	2	2	1
9.	Practical (Mandatory)	IDP14001	Interdisciplinary Project	0	0	5	5	3
10.	Practical (Mandatory)	SOC14100	# Community Service	0	0	0	0	1
<b>Total</b>				<b>12</b>	<b>4</b>	<b>15</b>	<b>31</b>	<b>25</b>

**# Community Service will be taken up during the summer vacation of II Semester and evaluated in III Semester.**

**SEMESTER-IV**

<b>S. No</b>	<b>Type</b>	<b>Course Code</b>	<b>Subject Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Contact Hrs/wk</b>	<b>Credits</b>
1.	Theory (PCC)	BME11007	Prof. Core – IV (Basic Clinical Science)	3	0	0	3	3
2.	Theory (PCC)	BME11008	Prof. Core – V (Biomedical Signal Acquisition & Processing)	3	1	0	4	4
3.	Theory (PCC)	BME11009	Prof. Core – VI (Microprocessors and Microcontrollers)	3	0	0	4	3
4.	Theory (PCC)	BME11010	Prof. Core – VII (Biomaterials)	3	1	0	3	4
5.	Theory (PCC)	BME11016	Prof. Core – VIII (Medical Imaging Systems)	3	1	0	4	4
6.	Theory (Mandatory)	PSG11021	Human Values and Professional Ethics	2	0	0	2	2
7.	Practical (PCC)	BME12011	Prof. Core Lab – III (Digital Signal Processing Lab)	0	0	2	2	1
8.	Practical (PCC)	BME12012	Prof. Core Lab – IV (Microprocessors and microcontrollers Lab)	0	0	2	2	1
<b>Total</b>				<b>17</b>	<b>3</b>	<b>4</b>	<b>26</b>	<b>22</b>

**Total Credits (2<sup>nd</sup> Year) = 47 Credits**

**THIRD YEAR**

<b>SEMESTER –V</b>								
<b>S. No</b>	<b>Type</b>	<b>Course Code</b>	<b>Subject Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Contact Hrs /week</b>	<b>Credits</b>
1.	Theory (PCC)	BME11013	Prof. Core – IX (Biomechanics)	3	1	0	4	4
2.	Theory (PCC)	BME11014	Prof. Core – X (Digital System Design)	3	0	0	3	3
3.	Theory (PCC)	BME11015	Prof. Core – XI (Biomedical Instrumentation – I)	3	1	0	4	4
4.	Theory (PEC)	BME11042 BME11035 ECE11017	<b>Prof. Elective – I</b> 1. Medical Sensors and Transducers 2. Digital Design & Manufacturing Process 3. Foundation on Artificial Intelligence and Machine Learning	3	0	0	3	3
5.	Theory (PEC)	BME11033 BME11017 ECE11020	<b>Prof. Elective – II</b> 1. Modelling and Simulations of Biomedical Systems 2. Bio-fluid mechanics 3. Introduction to Machine Learning	3	0	0	3	3
6.	Practical (PCC)	BME12019	Prof. Core Lab – V (Biomechanics Lab)	0	0	2	2	1
7.	Practical (PCC)	BME12020	Prof. Core Lab – VI (Digital System Lab)	0	0	2	2	1
8.	Practical (PCC)	BME12021	Prof. Core Lab – VII (Biomedical Instrumentation – I Lab)	0	0	2	1	1
9.	Seminar (P/S/I)	BME15033	Technical Seminar	0	0	2	2	1
<b>Total</b>				<b>15</b>	<b>2</b>	<b>8</b>	<b>24</b>	<b>21</b>

SEMESTER –VI								
S. No	Type	Course Code	Subject Name	L	T	P	Contact Hrs/wk	Credits
1.	Theory (PCC)	BME11022	Prof. Core – XII (Measurements and Control Systems)	3	1	0	4	4
2.	Theory (PCC)	BME11023	Prof. Core – XIII (Digital Image Processing)	3	1	0	4	4
3.	Theory (PEC)	BME11043 BME11032 ECE11029	<b>Prof. Elective – III</b> 1. Advanced Applications of Biomedical Signal and Image Processing 2. Biofabrication 3. Introduction to Artificial Intelligence	3	0	0	3	3
4.	Theory (PEC)	BME11024 BME11039 ECE11032	<b>Prof. Elective – IV</b> 1. Rehabcare Engineering 2. Nature-inspired Design 3. Advanced Machine Learning	3	0	0	3	3
5.	Theory (OEC)	CSE11104 / EME43105	<b>Open Elective – I</b> Data Structures and Algorithms/ FEA-CFD	3	0	0	3	3
6.	Theory (HSSM)	ECO11505	Economics for Engineers	3	0	0	3	3
7.	Practical (PCC)	BME12028	Prof. Core Lab – VIII Lab (Measurements and Control Systems)	0	0	2	2	1
8.	Practical (Sessional) (PCC)	BME12029	Prof. Core Lab – IX (Digital Image Processing Lab)	0	0	2	2	1
9.	Practical (PEC)	BME12037 BME12038 ECE12038	<b>Prof. Elective – I/II Lab</b> 1. Advanced Application of Biomedical Signal and Image Processing Lab 2. Design of Implants Lab 3. Introduction to Machine Learning Lab	0	0	2	2	1
<b>Total</b>				<b>18</b>	<b>1</b>	<b>6</b>	<b>25</b>	<b>22</b>

**Total Credits (3<sup>rd</sup> Year) = 43 Credits**

**FOURTH YEAR**

<b>SEMESTER-VII</b>								
<b>S. No</b>	<b>Type</b>	<b>Course CODE</b>	<b>Subject Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Contact Hrs/week</b>	<b>Credits</b>
1.	Theory (HSSM)	MGT11402	Industrial Management	3	0	0	3	3
2.	Theory (PCC)	BME11026	Prof. Core – XIV (Biomedical Instrumentation-II)	3	1	0	4	4
3.	Theory (PEC)	BME11031 BME11044 BME11037	<b>Prof. Elective – V</b> 1. Telemedicine 2. Tissue Engineering & Design of Implants 3. AI and Machine Learning Applications in Biomedical Engineering	3	0	0	3	3
4.	Theory (OEC)	CSE11043 / ECE11037 / EEE11104 / MEE11040	<b>Open Elective – II</b> Machine Learning/ Mobile Communication/ Fundamentals of Electrical Machines/ Biomedical Design	3	0	0	3	3
5.	Theory (OEC)	CSE11036/ ECE11038/ EEE11103/ CEE11046	<b>Open Elective – III</b> Cloud computing/ Optical Communication/ Introduction to Control Systems/ Conservation of Water Resources	3	0	0	3	3
6.	Practical (PCC)	BME12033	Prof. Core Lab – X (Biomedical Instrumentation-II)	0	0	2	2	1
7.	Practical (PEC)	BME12032 BME12039 ECE12044	<b>Prof. Elective III/IV/V Lab</b> 1. Modelling and Simulations of Biomedical Systems Lab 2. Computational Biomechanics 3. Introduction to Artificial Intelligence Lab	0	0	2	2	1
8.	Practical (PCC)	BME14035	Summer Internship <sup>#</sup>	0	0	0	0	2
9.	Practical (PCC)	BME14036	Minor Project	0	0	6	6	3
<b>Total</b>				<b>15</b>	<b>1</b>	<b>10</b>	<b>26</b>	<b>23</b>

**# Summer Internship for 30 days will be taken at the end of 6<sup>th</sup> semester and will be evaluated in the 7<sup>th</sup> semester.**

Semester-VIII								
S. No	Type	Course Code	Subject Name	L	T	P	Contact Hrs/week	Credits
1.	Practical (PCC)	BME14037	Industry Work Experience / SIRE* / Major Project	0	0	12	12 (For Major Project only)	6
2.	Practical (PCC)	BME14038	Comprehensive Viva Voce	0	0	0	0	2
<b>Total</b>				<b>0</b>	<b>0</b>	<b>12</b>	<b>12</b>	<b>8</b>

\*SIRE: Scientific Investigation & Research Experience

Total Credits (4<sup>th</sup> Year) = 31 Credits

Total Credits Distribution Semester wise: (B. Tech)

Semester	I	II	III	IV	V	VI	VII	VIII	Total Credits
Credits	21	19	25	22	21	22	23	08	161

### Credit Distribution (Excluding Specialization)

Sl. No.	Category	Breakup of Credits	AU Credit Distribution %	AICTE Credit Distribution %
1.	Humanities, Social Sciences & Management Courses (HSSM)	11	07	07
2.	Basic Science Courses (BSC)	22	14	16
3.	Engineering Science Courses (ESC)	17	10	15
4.	Professional Core Courses (PCC)	75	47	40
5.	Professional Elective Courses (PEC)	17	10	11
6.	Open Elective Courses (OEC)	09	06	11
7.	Mandatory Course (Mandatory)	10	06	00
<b>Total Credits</b>		<b>161</b>	<b>100</b>	<b>100</b>