

B. Tech. Biomedical Engineering
Curriculum Structure
(Effective from 2018-19)

1 st Semester								
Sl No	Paper Category	Paper Code	Theory	Contact Hours /Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	BS	M 101	Mathematics -I	3	1	0	4	4
2	BS	CH 101	Chemistry-I	3	0	0	3	3
3	ES	EE 101	Basic Electrical Engineering	3	0	0	3	3
4	HU	HU 101	English	2	0	0	2	2
Total of Theory							12	12
B. PRACTICAL								
5	BS	CH 191	Chemistry-I Lab	0	0	3	3	1.5
6	ES	EE 191	Basic Electrical Engineering Lab	0	0	3	3	1.5
7	ES	ME 191	Engineering Graphics & Design	0	0	3	3	1.5
C. SESSIONAL								
8	MC	XC181	Extra Curricular Activity	0	0	0	0	2 units
Total of Theory, Practical & Sessional							21	16.5
D. PROJECT*								
9	Project Code		Project Name	Contact Hours /Week				Credit Points
	M 151		Mathematics –I Project	1				0.5
	CH 151		Chemistry-I Project	1				0.5
	EE 151		Basic Electrical Engineering Project	1				0.5
	HU 151		English Project	1				0.5
*Total of Project				2				1
Total of Theory, Practical, Sessional and Project				23				16.5 + 1

***Students need to select any two projects (Total Credit: 0.5*2 =1)**

Total Credit in Semester I: 16.5 + 1= 17.5

2 nd Semester								
Sl No.	Paper Category	Paper Code	Theory	Contact Hours /Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	BS	M 201	Mathematics -II	3	1	0	4	4
2	BS	PH 201	Physics - I	3	0	0	3	3
3	ES	EC 201	Basic Electronics Engineering	3	0	0	3	3
4	ES	CS 201	Programming for Problem Solving	3	0	0	3	3
5	ES	ME 201	Engineering Mechanics	3	0	0	3	3
Total of Theory							16	16
B. PRACTICAL								
6	ES	CS291	Programming for Problem Solving Lab	0	0	3	3	1.5
7	BS	PH291	Physics -I Lab	0	0	3	3	1.5
8	ES	EC 291	Basic Electronics Engineering Lab	0	0	3	3	1.5
9	ES	ME 292	Workshop/Manufacturing Practice	0	0	3	3	1.5
10	HU	HU 291	Language Lab and Seminar Presentation	0	0	2	2	1
C. SESSIONAL								
11	MC	XC281	Extra Curricular Activity	0	0	0	0	2 Units
Total of Theory, Practical & Sessional							30	23
D. PROJECT*								
12	Project Code		Project Name	Contact Hours /Week				Credit Points
	M 251		Mathematics –II Project	1				0.5
	PH 251		Physics – I Project	1				0.5
	EC 251		Basic Electronics Engineering Project	1				0.5
	CS 251		Programming for Problem Solving Project	1				0.5
	ME 251		Engineering Mechanics Project	1				0.5
*Total of Project				2				1
Total of Theory, Practical, Sessional and Project				32				23 + 1

***Students need to select any two projects (Total Credit: 0.5*2 =1)**

Total Credit in Semester II: 23 + 1= 24

3 rd Semester								
Sl No	Paper Category	Paper Code	Theory	Contact Hours /Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	BS	M(BME)301	Mathematics -III	3	1	0	4	4
2	ES	EE(BME)301	Circuit Theory	3	0	0	3	3
3	PC	BME 301	Engineering Physiology & Anatomy	3	0	0	3	3
4	PC	BME 302	Biophysical Signals & System	3	0	0	3	3
5	PC	BME 303	Biomechanics-I (Solid)	3	0	0	3	3
Total of Theory							16	16
B. PRACTICAL								
6	ES	EE(BME)391	Circuit Theory Lab	0	0	2	2	1
7	PC	BME 391	Engineering Physiology & Anatomy Lab	0	0	3	3	1.5
8	PC	BME 392	Biophysical Signals & System Lab	0	0	3	3	1.5
C. SESSIONAL								
9	PW	BME 381	Innovations & Technical Skill Development	0	0	3	3	1.5
Total of Theory, Practical & Sessional							27	21.5
D. PROJECT*								
10	Project Code		Project Name	Contact Hours /Week				Credit Points
	M(BME)351		Mathematics –III Project	1				0.5
	EE(BME)351		Circuit Theory Project	1				0.5
	BME 351		Engineering Physiology & Anatomy Project	1				0.5
	BME 352		Biophysical Signals & System Project	1				0.5
	BME 353		Biomechanics-I (Solid) Project	1				0.5
*Total of Project				4				2
Total of Theory, Practical, Sessional and Project				31				21.5+2

***Students need to select any four projects (Total Credit: 0.5*4 =2)**

Total Credit in Semester III: 21.5+2=23.5

4 th Semester								
Sl No	Paper Category	Paper Code	Theory	Contact Hours /Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	BS	PH(BME) 401	Physics-II	3	0	0	3	3
2	PC	BME 401	Biomaterials	3	0	0	3	3
3	PC	BME 402	Biomechanics-II (Fluid)	3	0	0	3	3
4	ES	EC(BME) 402	Analog & Digital Electronics	3	0	0	3	3
5	HU	HU 403	Economics for Engineers	2	0	0	2	2
Total of Theory							14	14
B. PRACTICAL								
6	BS	PH(BME) 491	Physics-II	0	0	2	2	1
7	PC	BME 491	Biomaterials & Biomechanics Lab	0	0	3	3	1.5
8	ES	EC(BME) 492	Analog & Digital Electronics Lab	0	0	3	3	1.5
C. SESSIONAL								
9	MC	MC 401	Environmental Science	2	0	0	2	2 Units
10	PW	BME 481	Technical Topic Presentation	0	0	2	2	1
11	PW	BME 482	Hospital Training	0	0	0	0	1
Total of Theory, Practical & Sessional							26	20
D. PROJECT*								
12	Project Code		Project Name	Contact Hours /Week				Credit Points
	PH(BME)451		Physics-II Project	1				0.5
	BME 451		Biomaterials Project	1				0.5
	BME 452		Biomechanics-II (Fluid) Project	1				0.5
	EC(BME) 452		Analog & Digital Electronics Project	1				0.5
	HU 453		Economics for Engineers Project	1				0.5
*Total of Project				4				2
Total of Theory, Practical, Sessional and Project				30				20+2

***Students need to select any four projects (Total Credit: 0.5*4 =2)**

Total Credit in Semester IV: 20+2=22

5 th Semester								
Sl No.	Paper Category	Paper Code	Theory	Contact Hours /Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	PC	BME 501	Biomedical Instrumentation	3	0	0	3	3
2	PC	BME 502	Biosensors & Transducers	3	0	0	3	3
3	PC	BME 503	Medical Imaging Techniques	3	0	0	3	3
4	HU	HU 504	Principles of Management	2	0	0	2	2
5	PE	BME 504A BME 504B BME 504C	Biophysics & Biochemistry Bio-nanotechnology Computers in Medicine	3	0	0	3	3
6	OE	BME 505A BME 505B BME 505C	Data Structure & Algorithm Database Management System Control Engineering	3	0	0	3	3
Total of Theory							17	17
B. PRACTICAL								
7	PC	BME 591	Biomedical Instrumentation Lab	0	0	3	3	1.5
8	PC	BME 592	Biosensors & Transducers Lab	0	0	3	3	1.5
9	OE	BME 595A BME 595B BME 595C	Data Structure & Algorithm Lab Database Management System Lab Control Engineering Lab	0	0	2	2	1
C. SESSIONAL								
Total of Theory, Practical & Sessional							27	21
D. PROJECT*								
10	Project Code		Project Name	Contact Hours /Week				Credit Points
	BME 551		Biomedical Instrumentation Project	1				0.5
	BME 552		Biosensors & Transducers Project	1				0.5
	BME 553		Medical Imaging Techniques Project	1				0.5
	HU 554		Principles of Management Project	1				0.5
	BME 554A BME 554B BME 554C		Biophysics & Biochemistry Project Bio-nanotechnology Project Computers in Medicine Project	1				0.5
	BME 555A BME 555B BME 555C		Data Structure & Algorithm Project Database Management System Project Control Engineering Project	1				0.5
	*Total of Project				4			
Total of Theory, Practical, Sessional and Project				31				21+2

***Students need to select any four projects (Total Credit: 0.5*4 =2)**

Total Credit in Semester V: 21+2=23

6 th Semester								
Sl No.	Paper Category	Paper Code	Theory	Contact Hours/Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	PC	BME 601	Biomedical Digital Signal Processing	3	0	0	3	3
2	PC	BME 602	Analytical & Diagnostic Equipments	3	0	0	3	3
3	PC	BME 603	Advanced Imaging Systems	3	0	0	3	3
4	PE	BME 604A BME 604B BME 604C	Bioelectrical & Bioelectronic Measurement Communication Systems & Biotelemetry Medical Informatics	3	0	0	3	3
5	OE	BME 605A BME 605B BME 605C	Microprocessors & Microcontrollers VLSI & Embedded System Soft Computing	3	0	0	3	3
Total of Theory							15	15
B. PRACTICAL								
6	PC	BME 691	Biomedical Digital Signal Processing Lab	0	0	3	3	1.5
7	PC	BME 692	Biomedical Equipments Lab	0	0	3	3	1.5
8	PE	BME 694A BME 694B BME 694C	Bioelectrical & Bioelectronic Measurement Lab Communication Systems & Biotelemetry Lab Medical Informatics Lab	0	0	2	2	1
9	OE	BME 695A BME 695B BME 695C	Microprocessors & Microcontrollers Lab VLSI & Embedded System Lab Soft Computing Lab	0	0	2	2	1
C. SESSIONAL								
10	MC	MC 681	Seminar/ Group Discussion/ Foreign Language	0	0	2	2	2Units
11	PW	BME 681	Integrated Design Project I	0	0	2	2	1
12	PW	BME 682	Industrial Training	0	0	0	0	1
Total of Theory, Practical & Sessional							27	22
D. PROJECT*								
13	Project Code		Project Name	Contact Hours /Week				Credit Points
	BME 651		Biomedical Digital Signal Processing Project	1				0.5
	BME 652		Analytical & Diagnostic Equipments Project	1				0.5
	BME 653		Advanced Imaging Systems Project	1				0.5
	BME 654A BME654B BME654C		Bioelectrical & Bioelectronic Measurement Project Communication Systems & Biotelemetry Project Medical Informatics Project	1				0.5
	BME 655A BME 655B BME 655C		Microprocessors & Microcontrollers Project VLSI & Embedded System Project Soft Computing Project	1				0.5
*Total of Project				4				2
Total of Theory, Practical, Sessional and Project				31				22+2

*Students need to select any four projects (Total Credit: 0.5*4 =2)

Total Credit in Semester VI: 22+2=24

7 th Semester								
SI No.	Paper Category	Paper Code	Theory	Contact Hours /Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	PC	BME 701	Therapeutic Equipments	3	0	0	3	3
2	HU	HU702	Values & Ethics in Profession	2	0	0	2	2
3	PC	BME 702	Medical Image Processing	3	0	0	3	3
4	PE	BME 703A BME 703B BME 703C	Biomedical Hazards & safety Biological Control System Bioheat & Mass Transfer	3	0	0	3	3
5	OE	BME 704A BME 704B BME704C	Artificial Neural Networks Computational Methods for Biomolecules Laser and Fiber Optics in Medicine	3	0	0	3	3
Total of Theory							14	14
B. PRACTICAL								
6	PC	BME 791	Medical Instruments & Systems Lab	0	0	3	3	1.5
7	PC	BME 792	Medical Image Processing Lab	0	0	3	3	1.5
C. SESSIONAL								
8	MC	MC 781	Seminar/ Group Discussion/ Foreign Language	0	0	2	2	2Units
9	PW	BME 781	Integrated Design Project II	0	0	2	2	1
10	PW	BME 782	Major Project (Part I)	0	0	6	6	3
Total of Theory, Practical & Sessional							30	21

Total Credit in Semester VII: 21

8 th Semester								
Sl No.	Paper Category	Paper Code	Theory	Contact Hours /Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	PC	BME 801	Artificial Organ & Rehabilitation Engineering	3	0	0	3	3
2	PE	BME 802A BME 802B BME 802C	Radiotherapy & Nuclear Medicine Modeling of Physiological System BioMEMs	3	0	0	3	3
3	PE	BME 803A BME 803B BME 803C	Biomedical Equipment Management Tissue Engineering Telemedicine	3	0	0	3	3
4	PE	BME 804A BME 804A BME 804A	Hospital Engineering & Management Drug Delivery System Medical Robotics & Automation	3	0	0	3	3
Total of Theory							12	12
B. PRACTICAL/ SESSIONAL								
5	PW	BME 881	Project Seminar Presentation	0	0	0	0	2
6	PW	BME 882	Major Project (Part II)	0	0	6	6	4
7	PW	BME 883	Grand Viva	0	0	0	0	2
Total of Theory, Practical & Sessional							18	20

Total Credit in Semester VIII: 20

Mandatory Total Credit: 165 (4 years UG) +10 (Project Based Learning)

[For B.Tech. With Honours Degree, additional 10 Credit Point is to be earned (1st Sem to 8th Sem) through MOOCs courses.]**

For Honors additional 10 Credit Point is to be earned (1st Sem to 8th Sem) through MOOCs courses. All the Certificates received by the students across all semester for MOOCs Courses from approved organization (Listed by AICTE / MAKAUT) is to be submitted to CoE office prior to 8th Semester Examination and the Credit earned through MOOCs courses will be reflected in their DGPA.

Distribution of Credit

SEM	BS	HU	ES	PC	PE	OE	PW	MC (Unit)	Mandatory Project	Total
SEM1	8.5	2	6	-	-	-	-	2	1	17.5
SEM2	8.5	1	13.5	-	-	-	-	2	1	24
SEM3	4	-	4	12	-	-	1.5	-	2	23.5
SEM4	4	2	4.5	7.5	-	-	2	2	2	22
SEM5	-	2	-	12	3	4	-	-	2	23
SEM6	-	-	-	12	4	4	2	2	2	24
SEM7	-	2	-	9	3	3	4	2	-	21
SEM8	-	-	-	3	9	-	8	-	-	20
Total	25	9	28	55.5	19	11	17.5	10	10	175

Credit Distribution Ratio:

Category	Total Credit	Percentage of Proposed curriculum (wrt 165)	Credit Allocation As per AICTE
Basic Sciences	25	15.15	15 to 20%
Humanities & Social Sciences	9	5.45	5 to 10%
Engineering Sciences and Skills	28	16.97	15 to 20%
Professional Core	55.5	33.64	30 to 40%
Professional Electives	19	11.52	10 to 15%
Institutional Elective	11	6.67	5 to 10%
Project work, seminar, internship	17.5	10.61	10 to 15%
Mandatory Course	-	10 Units	-
Mandatory Additional Requirement for earning under Graduate Professional Degree	-	100 Units	-
Total	165		
Mandatory Project Work (1st to 6th Semester)	10		
MOOCs	10	Additional 10 Credit Point for B.Tech.(BME) with Honours	
Total	185		

All certificates received by the students across all the semesters for MOOCs from approved organizations (Listed by AICTE/MAKAUT) have to be submitted to COE Office prior 8th Semester Examination and the credit earned through MOOCs will be reflected in their DGPA.

**Mandatory Project Work (Project Based Learning)
For B.Tech Students from Academic Year 2018-19
(1st semester to 6th Semester)**

- Each Project Work will carry 0.5 Credit Point
- In the 1st and 2nd semester, students will do project work on any two subjects. The Choice of the subject on which a student wants to carry out his/her project work solely depends on the student. A Student can choose any 2 subjects of his/her own choice.
- In 3rd to 6th semesters, the total credit allocation is 2 for each semester. Hence, a student will have to carry out 4 project works to score 2 credits
- In 7th and 8th Semester, there will be no separate project work like previous semesters, since they have Major Project Work with high credit point
- Each Project will have total 100 marks
- Below given Table shows the allocation of credit and marks:

Semester	Total Credit Point	No. of Project to be carried out (Choice Based)	Marks allocation in each project	Total Marks allocated in Project Works
1st Year				
1 st Semester	0.5+0.5=1.0	2	100	200
2 nd Semester	0.5+0.5=1.0	2	100	200
2nd Year				
3 rd Semester	1.0+1.0=2.0	4	100	400
4 th Semester	1.0+1.0=2.0	4	100	400
3rd Year				
5 th Semester	1.0+1.0=2.0	4	100	400
6 th Semester	1.0+1.0=2.0	4	100	400
Total Credit	10			

Format for Project Work Evaluation (B.Tech)

College Name :
Paper Name :
STREAM :

Department :
Paper Code :
Semester :

University	Roll No.	Name of the Student	Title of the Project	Semester Examination										
				Project Report (10)	Development of Prototype/ Model (20)	Power point presentation (15)	Viva-Voce (15)	Usage of Modern Tool / Technology (10)	Innovativeness (10)	Individual contribution (10)	Group activity (10)	Total (100)		

(Signature of the Project Supervisor(s))

(Signature of the HoD)

MOOCs Courses
For B.Tech Students from Academic Year 2018-19
(1st semester to 8th Semester)

[For Honors additional 10 Credit Point is to be earned (1st Sem to 8th Sem) through MOOCs courses. All the Certificates received by the students across all semester for MOOCs Courses from approved organization (Listed by AICTE / MAKAUT) is to be submitted to CoE office prior to 8th Semester Examination and the Credit earned through MOOCs courses will be reflected in their DGPA.]

List of websites which offers online certification Courses (Not Limited to)

List of web portals which offer online certification courses:

- Swayam- <https://swayam.gov.in/>
- NPTEL- <https://onlinecourses.nptel.ac.in/>
- IIT Bombay Spoken Tutorial- <https://spoken-tutorial.org/>
- Mooc- <http://mooc.org/>
- Edx - <https://www.edx.org/>
- Coursera- <https://www.coursera.org/>
- Udacity - <https://in.udacity.com/>
- Udemy - <https://www.udemy.com/>
- Khanacademy - <https://www.khanacademy.org/>
- Skillsahre - <https://www.skillsahre.com/>
- Harvard University - <https://online-learning.harvard.edu/>
- Ted - <https://ed.ted.com/>
- Alison - <https://alison.com/>
- Futurelearn - <https://www.futurelearn.com/>
- Web Development - <https://digitaldefynd.com/best-free-web-development-courses-tutorials-certification/>
- Digital Marketing - <https://digitaldefynd.com/best-free-digital-marketing-certifications/>
- ios app development - <https://digitaldefynd.com/best-ios-app-development-course-tutorial/>
- Open Learn - <http://www.open.edu/openlearn/>
- Future Learn - <https://www.futurelearn.com/>
- Tuts Plus - <https://tutsplus.com/>
- Open Culture - <http://www.openculture.com/>