VIGNAN'S
Foundation for Science, Technology & Research
(Deemed to be University)
-Estd. u/s 3 of UGC Act 1956

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
Biomedical Engineering

Minutes of BoS meeting for B.Tech Biomedical Engineering

1. Meeting Started at 9:30 AM with, External BOS Members: Prof. M. Rama Subba Reddy, IIT Madras, Chennai, Prof. M.Malini, Osmania University, Hyderabad, Mr. S. Kumar, TMI Systems Bangalore, and Dr. Jeevana Latha, Health Hospital, Tenali. Dr. Amarnath, Amar Orthopaedic Hospital, Guntur was absent to the meetingEmergency Medicaland Commentswas taken from him. BOS chairman as Dr. T. Pitchaiah, HOD, ECE; Internal members as Dr. G.Sitaramanjaneya Reddy, Professor, Dr. Raja Chandrasekhar, Associate Professor, Dr. R.Ranganayakulu,Assist Professor, Mr. B. Sunil Tej, Asst. Prof. and Ms. Prathyusha, Assist Professor.
2. Dr. T. Pitchaiah started the meeting with introduction to the department and the biomedical engineering program starting fromroots, he said that more emphasis for R-21 syllabus is given to projects, when compared to skill based syllabus in R-16 & Project based learning in R-19 and more emphasis is given to including the IT related courses.
3. The following members were present for the Board of Studies meeting held on 24th July 2021on virtual mode, Department of Electronics and Communication Engineering (Biomedical Engineering), VFSTR, Vadlamudi, Guntur, and the BoS members suggested the following modifications.

External BoS Members:

1. Dr. Rama Subba Reddy, Professor, Dept. of Applied Engineering, IIT Madras, Chennai.
2. Dr. M.Malini, Professor, Dept. of Biomedical Engineering, Osmania University, Hyderabad.
3. Mr. S. Kumar, Sr.Manager, TMI Systems, Bangalore.
4. Dr. G. Jeevana Latha, M.D, General Practice, DialectologistHealth Hospitals, Tenali.

Internal BoS Members:

1. Dr.T. Pitchaiah, Professor &HoD, Department of ECE, VFSTR.
2. Dr. G. Sitaramanjaneya Reddy, Professor.
3. Mr. B. Sunil Tej, Assistant Professor.
4. Dr. Raja Chandrasekhar, Associate Professor.
5. Dr. R. Ranganayakulu, Assistant Professor.

6. Ms. K. Prathyusha, Assistant Professor.

- The external BoS members accepted the inclusion of IT related courses into the curriculum and suggested to reduce two courses from them, without compromising essential BME core courses.The comments given by the following BoS members

1. Dr. M. Rama Subba Reddy, Dept. of Applied Engineering, IIT Madras

- The course Constitution of India should not be considered in CGPA calculation, because it is a non-credit courses in AICTE and other universities are not considering for CGPA calculations.
- Merge the basic chemistry and biochemistry and rename the course as Clinical Biochemistry instead of Engineering Chemistry
- Renaming the Signals and Systems for bioengineers to Biomedical Signals and Systems and including basic physiological signals as examples in relevant units.
- Rename the Soft Skill Laboratory to Soft Skill Techniques as it is having 3 lecture hours instead of practical hours.
- BoS members approved the replacement of the Biostatics instead of P&S and suggested to inclusion of normal distribution and types before Chi square distribution.
- Rename the Medical Imaging Techniques to Medical Imaging Modalities and Unit 4 title change to radio isotopes.
- Open elective courses offered by the BME programme should be the general version of core subjects.
- The students who could not clear swayam courses should be given an alternative plan, which is to be mentioned in regulations.

2. Dr. M. Malini, Dept. of Biomedical Engineering, Osmania University.

- BME being a highly interdisciplinary field, we cannot avoid some core Electronics and Medical courses as these become absolutely necessary.
- While I very much appreciate the rationale behind introducing Computer Engineering courses into the BME stream, I believe it is important to include only the relevant computer engineering courses which find applications in medical field.
- Web technologies and OOPs through Java are not that important compared to the 5 essential BME core courses, which are missing in the curriculum and suggested to replace two core courses out of those 5 BME courses.
- Six IT courses are sufficient for IT jobs for BME graduates.
- DBMS, DS and Python programming should have medical applications.

- Strongly recommended to replace WT and OOPs through java with Medical Informatics and Assist Devices and Implant Technology, which helps students for getting admission in master degree in abroad universities

3. Mr. S. Kumar, Sr. Manager, TMI Systems, Bangalore.

- Include case studies on product development in the syllabus
- Include the software coding and firmware connected cloud in the syllabus.
- Include medical standards and regulations in the syllabus

4. Dr. G. Jeevana Latha, M.D, General Practice, Gynaecologist Health Hospitals, Tenali

- She raised a point that students should have more exposure on hospitals and should be stream lined in a way that suits their interest flowed by guidance in training.
- She advised that maximum of 3 weeks are enough for hospital training, provided visiting in broad range of departments and equipment, he said he would facilitate the visiting.

The above suggestions and comments evolved in the discussion of the R-21 BME course curriculum. Based on the suggestions, necessary modification will be incorporated. Approval of modifications will be taken from the External BoS Members through e-mail communication, which will be presented to academic council through approval of BoS chair.

The following are the outcomes of the meeting:

1. Major restructuring has taken place in the curriculum with IT related courses added which is oriented towards Software jobs and two new laboratories with simulation using COMSOL Multiphysics software and fabrication are oriented interdisciplinaryand societal centric projects, field projects, industrial related projects.
2. The curriculum follows the choice based credit system (CBCS).
3. The proposed course structure is approved with effect from the academic year 2021-22 for the 4 years of B.Tech programme in Biomedical Engineering. The proposed syllabus is applicable for 2021 admitted batch onwards.
4. The finalized Couse Structure is provided in Appendix I.
5. The curriculum is encompassing the courses that enable employability or entrepreneurship or skill development presented in Appendix II.
6. The courses in the revised curriculum (R21) significant changes are made in the content. The percentage of revision from R19 to R21 is 26%. The list of new courses is provided in Appendix III.
7. Analysed feedback from Stakeholder's in CDMC is placed before the BoS and given utmost priority while designing the curriculum and their suggestions are implemented.

Chairman, BoS

APPENDIX – I
Course Structure

I Year I Semester

S. No	Course Name	L	T	P	Credits
1	Engineering Mathematics-I (B)	3	1	-	4
2	Engineering Physics(C)	3	-	2	4
3	Basics of Electrical & Electronics Engineering	3	-	2	4
4	Engineering Graphics & Design	-	-	2	1
5	Basics of Engineering products	2	-	2	3
6	Constitution of India	1	-	-	1
7	Introduction to C Programming	3	-	2	4
8	Physical fitness, Sports & Games-1	-	-	3	1
	Total	15	1	13	22

I Year II Semester

S.No	Course Name	L	T	P	Credits
1	Engineering Mathematics-II(B)	3	1	-	4
2	Clinical Biochemistry	3	-	2	4
3	Programming for Problem Solving	3	-	2	4
4	Workshop	1	-	2	2
5	English Proficiency and communication skills	-	-	2	1
6	Fundamentals of Anatomy and Physiology	3	-	2	4
7	Technical English Communication	2	-	2	3
8	Physical fitness, Sports & Games-2	-	-	3	1
	Total	15	1	15	23

II Year I Semester

S.No	Course Name	L	T	P	Credits
1	Biostatistics	3	-	-	3
2	Basic Clinical Sciences	3	-	-	3
3	Biomedical Instrumentation	3	-	2	4
4	Analog Electronic Circuits	3	-	2	4
5	Electrical Circuit Theory	3	-	-	3
6	Data Structures	2		2	3
7	Life skills-I	-	-	2	-
8	Environmental Science	1	-	-	1
9	Technical Seminar-I	-	-	2	1
10	Intra Disciplinary Project-I	-	-	2	1
11	Physical fitness, Sports & Games-III	-	-	2	1
	Total	18	1	14	24

II Year II Semester

S.No	Course Name	L	T	P	Credits
1	Biomedical Signals and Systems	3	-	2	4
2	Linear and Digital ICs	3	-	2	4
3	Biomaterials and Artificial Organs	3		2	4
2	Medical Informatics	3	-	-	3
5	Open Elective -I	2	-	2	3
6	Life skills-II	-	-	2	1
7	Intra-Disciplinary Project-II	-	-	2	1
8	Technical Seminar-II	-	-	2	1
	Total	14		14	21

III Year I Semester

S.No	Course Name	L	T	P	Credits
1	Diagnostic and Therapeutic Equipment's	3	-	2	4
2	Microprocessor and Microcontroller	3	-	2	4
3	Assist Devices and Implant Technology	3	-	-	3
4	Open Elective -II	2	-	2	3
5	Department Elective-I	3	-	-	3
6	Soft skills Laboratory	3	-	-	3
7	Employability skills -1	-	-	2	-
8	Human Values, Professional Ethics Gender Equity	-	-	-	-
9	Inter-departmental Project-I	-	-	4	2
	Total	17	-	12	22

III Year II Semester

S.No	Course Name	L	T	P	Credits
1	Medical Imaging Modalities	3	-	-	3
2	Biomedical Signal Processing	3	-	2	4
3	Biosensors and Transducers	3	-	2	4
4	Department Elective-II	3	-	-	3
5	Professional communications Laboratory	-	-	2	1
6	Open Elective(NPTEL/Coursera)	3	-	-	3
7	Employability skills -II	-	-	2	1
8	Inter-Departmental Project-II	-	-	4	2
9	Open Elective -III	-	-	4	2
10	Mini Project	-	-	4	2
11	Modular course	-	-	2	1
	Total	15	0	22	26

IV Year I Semester

S.No	Course Name	L	T	P	Credits
1	Biomechanics	3	-	2	4
2	Medical Image Processing	3	-	2	4
3	Hospital Management	3	-	-	3
4	Department Elective-III (Swayam/NPTEL)	3	-	-	3
5	Department Elective-IV (Swayam/NPTEL)	3	-	-	3
6	Societal Centric project	-	-	6	3
	Total	15	-	10	20

IV Year II Semester

S. No	Course Name	L	T	P	Credits
1	Internship/Project work	-	-	24	12

DEPARTMENT ELECTIVE COURSES

S.No	Course Name	L	T	P	Credits
1	Analog And Digital Communication	3	-	-	3
2	Tele Medicine	3	-	-	3
3	Assist Devices And Implant Technology	3	-	-	3
4	Rehabilitation Engineering	3	-	-	3
5	Physiological Control Systems	3	-	-	3
6	Fiber Optics And Lasers In Medicine	3	-	-	3
7	Virtual Bio-instrumentation	3	-	-	3
8	Physiological Control Systems	3	-	-	3
9	VLSI	3	-	-	3
10	Robotics And Automation In Medicine	3	-	-	3
11	Machine Vision In Medical Technology	3	-	-	3
12	Biofluids And Dynamics	3	-	-	3
13	Medical Physics	3	-	-	3

***The courses that are highlighted denote implementation of 'Choice Based Credit System (CBCS)|"**

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APPENDIX - II

List of courses that enable Employability/Entrepreneurship /Skill Developmentin the R-21

S.No	Name of the Courses	Employability/Entrepreneurship/ Skill development
1	Engineering Mathematics-I (B)	Skill development
2	Engineering Physics(C)	Skill development
3	Basics of Electrical & Electronics Engineering	Skill development
4	Introduction to C Programming	Skill development
5	Engineering Mathematics-II(B)	Skill development
6	Clinical Biochemistry	Skill development
7	Programming for Problem Solving	Skill development
8	Workshop	Skill development
9	Technical English Communication	Skill development
10	Fundamentals of Anatomy & Physiology	Skill development
11	Biostatistics	Skill development
11	Basic Clinical Sciences	Employability
12	Biomedical Instrumentation	Employability
13	Analog Electronic Circuits	Employability
14	Electrical Circuit Theory	Skill development
15	Intra Disciplinary Project-I	Skill development
16	Data Structures	Employability
17	Technical Seminar	Employability
18	Biomedical Signals and Systems	Employability
19	Linear and Digital ICs	Employability
20	Biomaterials and Artificial Organs	Employability
21	Data Base Management System	Employability
22	Medical Informatics	Skill development
23	Intra Disciplinary Project-II	Skill development
24	Diagnostic and Therapeutic Equipments	Employability
25	Microprocessors and Microcontrollers	Employability
26	Biosensors and Transducers	Employability
27	Biomechanics	Skill development
28	Analog and Digital Communications	Skill development
30	Inter-departmental Project-I	Skill development
31	Biomedical Signal Processing	Employability
32	Medical Imaging Modalities	Employability
33	Python Programming	Employability
34	Modular Course	Employability
35	Competitive Coding	Employability
36	Mini Project	Employability
37	Inter-departmental Project-II	Skill development
38	Medical Image Processing	Employability

39	Societal Centric project	Skill development
40	Hospital Management	Entrepreneurship
41	Medical Informatics	Skill development
42	Telemedicine	Skill development
43	Assist Devices and Implant Technology	Skill development
44	Biofluids and Dynamics	Skill development
45	Rehabilitation Engineering	Skill development
46	Embedded Systems for Medical Devices	Employability
47	Fiber Optics and Lasers in Medicine	Employability
48	Machine Vision in Medical Technology	Employability
49	Medical Physics	Employability
50	Physiological Control Systems	Skill development
51	Robotics and Automation in Medicine	Skill development
52	Virtual Bio-Instrumentation	Skill development
53	VLSI	Skill development
54	Internship / Project work	Employability

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APPENDIX - III
List of new courses in the R-21
B.Tech – Biomedical Engineering Curriculum

S.No	Name of the Courses
1	Biostatistics
2	Clinical Biochemistry
3	Electric Circuit Theory
4	Biomedical Signals and Systems
5	Linear Digital ICs
6	Biomaterials and Artificial Organs
7	Diagnostic and Therapeutic Equipments
8	Biomechanics
9	Medical Imaging Modalities
10	Medical Informatics
11	Telemedicine
12	Assist Devices and Implant Technology
13	Rehabilitation Engineering
14	Embedded Systems for Medical Devices
15	Fiber Optics and Lasers in Medicine
16	Machine Vision in Medical Technology
17	Computers and Hardware interfacing
18	Physiological Control Systems
19	Robotics and Automation in Medicine
20	Virtual Bio-Instrumentation

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