

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE PROJECT-II
(CODE: 3360307)**

Diploma Programmes in which this course is offered	Semester in which offered
Biomedical engineering	Sixth

1. RATIONALE

The students are required to prepare a large project in field of Bio-Medical engineering, which is not studied so far but may be extension of the topics of the subject studied or collections of data related to recent advancements in the area of Bio-Medical engineering. Also they can develop their technical ability of developing and maintaining the biomedical equipments.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- i. Co-creation & Interpersonal abilities.**
- ii. Design & Troubleshooting.**
- iii. Programming/simulation/ debugging skills.**
- iv. Developing PCB design/soldering skills.**
- v. Documentation & Presentation skill.**
- vi. Creating the technical ability like maintaining, repairing, Calibrating, Producing and developing software program for Medical equipments.**
- vii. Prepare and understanding the specifications of medical equipments for manufacturing and purchasing for the Hospital.**

3. Course Outcomes

At the end of the course, student will able to

- i. Create familiarity with the industry personnel & industrial environment as well as processes.
- ii Survey the related literature.
- iii Define the problem and the objectives of the project.
- iv Suggest various design alternatives and justification of the selection of the design methodology for the problem solution along with design specifications.
 - v Modeling and analysis of the proposed solution.
- vi. Simulate, Design and debugging of the circuit
- vii Partial Implementation of the proposed solution
- viii. Develop program logic of the proposed solution
- ix. Locate the problem and troubleshoot.
- x. Work in team cohesively & effectively
- xi Prepare project report having organized documentation.

- xii. Prepare & deliver presentation.
- xii. Enhance awareness for latest technologies and tools
- ix. Visualize the roadmap of the further development.

4. Teaching and Examination Scheme

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	PA	ESE	PA	150
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Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit ESE - End Semester Examination; PA - Progressive Assessment.

5. SUGGESTED LIST OF EXERCISES/PRACTICALS/PROJECTS.

The practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies. Following is the list of practical exercises for guidance.

Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of Programme Outcomes/Course Outcomes in affective domain as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain

*** Select a project title related to the field of Biomedical Instrumentation. This project work in the sixth semester can be an extension of fifth semester subject Project-I. The areas in Biomedical Instrumentation can be from the list given below:**

S. No.	Suggested Areas
1	General Medical Instrumentation
2	Electronic models of Anatomical structure of human body
3	Rehabilitation Engineering
4	Processor and controllers
5	Critical Care Instrumentation
6	Diagnostic Instrumentation
7	Advance communication in Medical field
8	Computer based Instrumentation & Software systems
9	Advancement in Medical Transducers
10	Virtual Instrumentation
11	Medical Imaging Techniques
12	Physiotherapy

Few titles are suggested below:

S. No.	Suggested Sample Titles
1	Blood pressure monitor with high and low pressure Alert System
2	Temperature Analyzers with computerized graphical image
3	Bedside Patient Monitoring System With Remote Alert
4	Heart Beat Monitoring System With Wireless Pc Interfacing Including Body & Respiratory Temperature
5	Automatic Anesthesia Feeder Based On Medical Analysis
6	Wireless Heart Beat Rate Monitoring & A Cardiac Pacemaker Simulation Mobile Messenger
7	Automatic Anesthesia Controller With Respiratory Using Infusion Pump
8	Automatic Anesthesia Controller Using Infusion Pump With Heart Beat Rate
9	Personal identification and verification based on multiple biometric features.
10	Short range medical telemetry system
11	Personal identification and verification based on multiple biometric features.
12	Device to measure the stiffness of intact mouse heart

6. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- i. Student should make a large project by implement their ideas.
- ii. Student should prepare the project report and power point presentation.

7. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- i. Arranging Industrial visit.
- ii. Medical instruments study.
- iii. Lab work (Project workshop).

8. SUGGESTED LEARNING RESOURCES

A) List of Books: --NA--

S. No.	Title of Book	Author	Publication
1.	Handbook of Biomedical Instrumentation	R. S. Khandpur	Tata McGraw-Hill Education, 2003
2.	Electronics in Medicine and Biomedical Instrumentation	NANDINI K. JOG	PHI Learning Pvt. Ltd., 2013
3.	Biomedical Instrumentation: Technology and Applications (Google eBook)	R. Khandpur	McGraw Hill Professional, 2004
4.	Principles of Medical Electronics and Biomedical Instrumentation	C. Raja Rao, Sujoy K. Guha	Universities Press, 2001

5.	Biomedical Instruments: Theory and Design	Walter Welkowitz, Sid Deutsch, Metin Akay	Academic Press, 2008
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B) List of Major Equipment/ Instrument with Broad Specifications

- i. CRO/DSO
- ii. Analog and Digital Multi meters
- iii. Scilab/MATLAB and Biomedical related Toolboxes
- iv. Lab view software
- v. Data acquisition Cards
- vi. Signal Conditioning Units
- vii. Proteus software
- viii. Electronics Work batch

C) List of Software/Learning Websites

- <http://www.electronics-tutorials.com/>
- <http://etechsystems.blogspot.in/>
- <http://iambiomed.com/blogs/biomedical-project-list/>
- http://projectsqa.com/forum_posts.asp?TID=43
- http://projectsqa.com/forum_posts.asp?TID=119
- <http://www.efymag.com/>

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE Faculty Members from Polytechnics

- **Prof. N.D.Makwana**, Lecturer ,Dept of Biomedical engineering, G.P.Gandhinagar
- **Prof. B.C.Changela**, Lecturer, Dept of Biomedical engineering, A.V.P.T.I. Rajkot.
- **Prof. A.K.Bula**, Lecturer ,Dept of Instrumentation engineering, G.P.Gandhinagar
- **Prof. M.H.Dave**, Lecturer ,Dept of Biomedical engineering, G.P.Gandhinagar
- **Prof. S.S.Malkan**, Lecturer ,Dept of Biomedical engineering, G.G.P.Ahmedabad

Coordinator and Faculty Members from NITTTR Bhopal

- **Prof. Susan S Mathew**, NITTTR, Bhopal
- **Dr. S.K.Gupta**, NITTTR, Bhopal