GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3162111
Semester – VI
Subject Name: Biomaterials

Type of course: Engineering/science

Prerequisite: Basic fundamentals of introduction to materials engineering

Rationale: The syllabus is design to introduce the student to the range of biomaterials and the science and engineering of biomaterials. To understand constraints associated with the use of biomaterials

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Tutorial Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	1	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	Types of biomaterials	**03**
2	Biological environment	**04**
3	Mechanical and physico-chemical properties of biomaterials	**09**
4	Resorbability, bio degradation, Biological responses, compatibility, cytotoxicity, cell biomaterial interactions, associated characterization.	**08**
5	Metals, Polymers, Ceramics, Natural biomaterials	**12**
6	Blends, composites, biopolymers, Hydrogels	**04**
7	Drug delivery systems	**02**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20%	**35%**	**30%**	**15%**	**0%**	**0%**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Introduction to Biomaterials: Basic Theory with Engineering Applications; C.L Agrawal, J.L. Ong, Mark R Appleford, Gopinath Mani, Canbridge University Press,2013
2. Bikramjit Basu; Biomaterials Science and Tissue Engineering: Principles and Methods; Cambridge University Press; ISBN: 9781108415156; 2017.
3. Biomaterials-Sujata V. Bhat, Alpha Science International, 2005 - Science

Course Outcomes
After completing this course, students will able to,

Sr. No.	CO statement	Marks % weightage
CO-1	Explain the types of Biomaterials and their relative advantages and disadvantages	55
CO-2	Indicate the constraints placed on the use of materials in biological environments	30
CO-3	Select Biomaterials from the perspective of application on the basis of Characterization.	15

List of Tutorials:

As per the content of units.

List of Open Source Software/learning website:

I. http://nptel.iitm.ac.in/
II. https://nptel.ac.in/courses/113/104/113104009/-Introduction to Biomaterials-IIT Kanpur
III. https://onlinecourses.nptel.ac.in/noc20_bt12/preview Medical Biomaterials course by Prof. Mukesh Doble, IIT-Madras.
IV. www.ocw.mit.edu