

DEPARTMENT OF __METALLURGICAL AND MATERIALS ENGINEERING__
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	M Tech. (Materials Science and Engineering)		
Course Title	Biomaterials		
Course Code	MT 663	No. of Credits	3
Course Code of Pre-requisite subject(s)	Nil		
Session	Jan 2019	Section (if, applicable)	NA
Name of Faculty	Dr. N. Ramesh Babu	Department	MME
Email	rameshrohith@gmail.com nrb@nitt.edu	Telephone No.	2503464 99444932221
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail	NA	Telephone No.	NA
Course Type	Elective course		
Syllabus (approved in BoS)			
<p>Introduction to biomaterials; need for biomaterials; Salient properties of important material classes; Property requirement of biomaterials; Metallic implant materials, ceramic implant materials, polymeric implant materials, composites as biomaterials; Orthopedic, dental and other applications.</p> <p>Biomaterials preparation and characterization; Processing and properties of different bioceramic materials; Mechanical and physical properties evaluation of biomaterials; New and novel materials for biomedical applications. Design concept of developing new materials for bio-implant applications; Nanomaterials and nanocomposites for medical applications.</p> <p>Concept of biocompatibility; cell-material interactions and foreign body response; assessment of biocompatibility of biomaterials; In-vitro and In-vivo evaluation; Dissolution study, cytotoxicity test, cell adhesion test; Antibacterial assessment: Kirby–Bauer disc diffusion method or antibiotic sensitivity test and spread plate method.</p> <p>Biomaterials for drug delivery, timed release materials; biodegradable polymers; Blood compatible materials; Biomimetics; Bone biology: bone architecture, collagen, osteoblasts, osteoclasts, etc; Protein mediated cell adhesion.</p> <p>Introduction to tissue engineering; Applications of tissue engineering; Biomaterials world wide market, technology transfer and ethical issues; Standards for biomaterials and devices.</p>			

COURSE OBJECTIVES

The objective of this course is to provide students a fundamental understanding of different materials (metallic, ceramic, polymeric, composite, and biological materials) for biomedical-applications and their in-vitro and in-vivo characteristics. This course will also provide students an introduction to bone biology, tissue engineering and ethical issues in biomaterials research.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
<p>After the completion of this course, the student will be able to:</p> <p>At the end of this course, the students would be able to:</p> <p>Understand the properties of different biomaterials [1]</p> <p>Understand the synthesis and processing methods for producing the different biomaterials [1,2]</p> <p>Know the advantages and disadvantages of different biomaterials and select materials for different applications. [1,3]</p> <p>Characterize the biomaterials for their physico-chemical properties and analyze the cell-material interactions [1,3]</p> <p>Design new biomaterials for different biomedical applications [6,7]</p>	<ol style="list-style-type: none"> 1. Materials Science and Engineering post graduates are attaining knowledge of materials and their science & Engineering 2. Materials Science and Engineering post graduates are talented to formulate and analyse the engineering data. 3. Materials Science and Engineering post graduates can recognize classify and solve engineering problem. 4. Materials Science and Engineering post graduates are capable of exploring the resources to collect the required data, analyse and solve critical problems. 5. Materials Science and Engineering post graduates have skills in locating and applying modern tools to resolve the complex engineering problems 6. Materials Science and Engineering post graduates are competent to work in research, industrial sectors and with multi-faceted team 7. Materials Science and Engineering post graduates have the capacity to design, plan and execute complex processes adhering to environmental considerations and cost effectiveness. 8. Materials Science and Engineering post graduates are capable to communicate effectively to engineering community and explain well to the society. 9. Materials Science and Enggeering post graduates have motivation for enduring education to maintain competency. 10. Materials Science and Engineering post graduates have gained knowledge to adhere to the ethical considerations and play a key role in sustainable development. 11. Materials Science and Engineering post graduates are capable to asses both persons and problems & take decisions independently

COURSE PLAN – PART II				
COURSE TEACHING AND LEARNING ACTIVITIES				
S.No.	Week/Contact Hours	Topic	Mode of Delivery	
1.	I-III	Introduction to biomaterials	Classroom teaching + Guest Lectures + Exposure to the facilities available at NITT/Research Labs/Industry	
2.	IV-VI	Biomaterials preparation and characterization		
3.	VII-IX	Concept of biocompatibility and evaluation tests		
4.	X-XII	Applications of biomaterials		
5.	XIII-XIV	Tissue engineering and its applications		
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	One Assignment	X- XIV week	-----	10
2	Seminar and write-up	XIII- XIV week	30 min presentation	15
3	One cycle test	Around IX week	1.5 h	25
	Compensation Assessment* Re-test	XII week	1.5 h	25 (If any student misses 1 st cycle test for medical reasons)
	Guest Lectures (2 lectures subjected to Institute approvals)	After VIII week	1 h each	Nil
	Attendance	-----	-----	Nil
4	Final Assessment * End semester exam based on classroom teaching	Around XV	3 h	50
*mandatory; refer to guidelines on page 4				
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				

The feedback from students will be assessed based on the questionnaire prepared by the institute and expected attainment to be 75%.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

The students are expected to attend all the classes except for medical reasons. Minimum attendance of 75% is required for writing the semester examination.

Apart from technical content and presentation, plagiarism will be checked for the write-up on seminar topic

MODE OF CORRESPONDENCE (email/ phone etc)

The Course Coordinator is available for consultation at any time.

Students can also contact me at any time through phone or by e-mail.

The phone number and email id will be given to the students at the beginning of the course

COMPENSATION ASSESSMENT POLICY

Retest will be conducted for the portion of the course completed.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

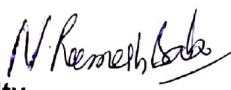
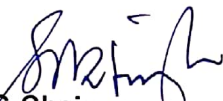
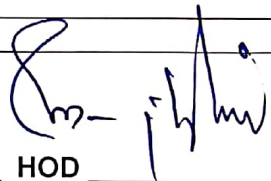
- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

The Course Coordinator is available for consultation at any time.		
Students can also contact me at any time through phone or by e-mail.		
Grading as per the Institute Policy		
FOR APPROVAL		
 Course Faculty _____	 CC-Chairperson _____	 HOD _____

19.02.19

Guidelines:

- a) The number of assessments for a course shall range from 4 to 6.
- b) Every course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or class average/2 whichever is greater.		Peak/3 or class average/2 whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.