



MR 203 Aug. -Dec. 2017 3:0

Introduction to Biomaterials

Instructor

BIKRAMJIT BASU

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Teaching Assistant

NA

Email: NA

Department: MRC

Course Time: Tue Thu 5-6.30 pm

Lecture venue: MMCR, MRC

Detailed Course Page: NA

Announcements

NA

Brief description of the course

This course was designed to teach the students on the fundamentals of Materials Science and Biological Sciences so that they appreciate the breadth and depth of the field of biomaterials together with the clinical relevance.

Prerequisites

NA

Syllabus

Introduction to basic concepts of Biomaterials Science; Salient properties of important material classes; overview of body environment, Manufacturing and properties of metals, ceramics, polymers and composites; Concept of biocompatibility, host response, structure-property of biological cell; Structure and properties of cells, protein and cellular adaptation process; Cell Communication, Cell Migration and Cell Division and cell death, Cell Differentiation and Cell Death , Cell Apoptosis- I, Structure and properties of Protein; cell - material interaction, Assessment of biocompatibility of biomaterials, Structure and properties of bone as well as in vivo testing and histocompatibility assessment, Important biometallic alloys (Ti-alloy, Co-Cr-Mo alloys),

Processing and Properties of Bioceramics, Fracture and toughening of Bioceramic composites, Development of hydroxyapatite-based bioceramic composites for hard tissue replacement, HAp-based composites with bactericidal property and glass ceramics for dental restoration, Glass-ceramics for dental restoration applications, Structure and properties of polymers and polymeric biocomposites, Some special topics (External field and cell-material interaction), Tissue Engineering and wound healing

Course outcomes

The course was completed successfully. Importantly, I organised extra lectures by neurosurgeons and prosthodontist by clinicians to excite the students into the clinical relevance of the biomaterials.

Grading policy

Mid term - 30 %

End term - 70 %

Assignments

NA

Resources

1. Bikramjit Basu; Biomaterials Science and Tissue Engineering: Principles and Methods; Cambridge University Press; ISBN: 9781108415156; available in market by August, 2017.
2. Bikramjit Basu; Biomaterials for Musculoskeletal regeneration: concepts, Springer Nature; Singapore, 2017 [ISBN: 978-981-10-3058-1 (Print) 978-981-10-3059-8 (Online)]
3. Bikramjit Basu and Sourabh Ghosh; Biomaterials for Musculoskeletal regeneration: Applications; concepts, Springer Nature; Singapore; 2017 [ISBN: 978-981-10-3016-1 (Print) 978-981-10-3017-8 (Online)]
4. Fredrick H. Silver and David L. Christiansen, Biomaterials Science and Biocompatibility, Springer, Piscataway, New Jersey, first edition, 1999.
5. Janathan Black, Biological Performance of Materials: Fundamentals of Biocompatibility, Marcel Dekker, Inc., New York and Basel, 1999.