

ME 671 Biomaterials: Design and Applications (3-0-0-6)

Introduction; Classes of materials used in medicine: metals, polymers, FRPs, fabrics, nanocomposites, bioresorbable and bioerodable materials, ceramics, glasses; Host reactions to biomaterials: biocompatibility, implant associated infection; Testing of biomaterials: in vitro assessment, in vivo assessment, blood materials interactions; Design of materials for biomedical application: Cardiovascular, dental implants, orthopedic application, skin, ophthalmologic applications, wound healing, sutures, biomedical and biosensors; Implantation techniques for soft tissue and hard tissue replacements; Problems and possible solutions in implant fixation; Failure analysis of medical devices and implants.

Textbooks:

- [1] Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons.
Biomaterials Science: An Introduction to Materials in Medicine, Academic Press, 2004, USA
- [2] J.B. Park and J.D. Bronzino. Biomaterials: Principles and Applications. CRC Press. 2002. ISBN: 0849314917

References:

- [1] T. M. Wright, and S. B. Goodman. Implant Wear in Total Joint Replacement: Clinical and Biologic Issues, Material and Design Considerations. American Academy of Orthopaedic Surgeons, 2001.
- [2] L Ambrosio. Biomedical composites, Woodhead Publishing Limited, UK, 2009
- [3] K.C. Dee, D.A. Puleo and R. Bizios. An Introduction to Tissue-Biomaterial Interactions. Wiley 2002. ISBN: 0-471-25394-4.
- [4] T.S. Hin (Ed.) Engineering Materials for Biomedical Applications. World Scientific. 2004. ISBN 981-256-061-0
- [5] B. Rolando (Ed.) Integrated Biomaterials Science. Springer. 2002. ISBN: 0-306-46678-3