

ME-696 Biomedical Devices and Systems (3-0-0-6)

Syllabus:

Introduction: biomedical engineering design, engineering approaches to clinical challenges, clinical problems requiring implants/devices for solution; Materials for biomedical implants and devices; Implantable devices and systems: Vascular and cardiovascular devices, pacemakers, heart valves, stents, synthetic grafts, orthopedic implants, intraocular lens implants, cochlear implants; Wearable devices: Assistive devices for the blind, foetal movement, finger movement, gait analyzer, ventricular assist devices, energy harvesting; Implantable neural prostheses and nerve stimulation: Brain, visual prosthesis, cochlear implants, spinal cord stimulation, cardiology system, artificial limbs; Minimally invasive devices and techniques: Instrumentation for Laparoscopic Surgery, Ocular Surgery; Imaging and image-guided techniques: endoscopy, medical ultrasound devices, medical X-ray imaging, imaging-aided design of personalized devices and assistive reproduction technology; Rehabilitation Engineering: Deafness, blindness, passive and active Orthoses and Prostheses.

Texts/Reference Books:

1. Andrés D. Lantada. Handbook on Advanced Design and Manufacturing Technologies for Biomedical Devices. Springer London 2013
2. Aimé Lay-Ekuakille and Subhas C. Mukhopadhyay, Wearable and Autonomous Biomedical Devices and Systems for Smart Environment. Springer-Verlag Berlin, 2010
3. David D. Zhou and Elias Greenbaum. Implantable Neural Prostheses 1. Devices and Applications. Springer, London, 2009
4. Gail D. Baura. Medical Device Technologies: A Systems Based Overview Using Engineering Standards Academic Press, Oxford, UK 2012
5. Paul H. King, Richard C. Fries. Design of Biomedical Devices and Systems. CRC press, Boca Raton, 2009
6. James Moore and George Zouridakis. Biomedical Technology and Devices Hand Book. CRC press, Washington DC, 2004
7. Martin Culjat, Rahul Singh, Hua Lee. Medical Devices: Surgical and Image-Guided Technologies, John Wiley & Sons, Inc New Jersey, 2013
8. ASM Handbook Volume 23, Materials for Medical Devices
9. Joseph D. Bronzino, Donald R. Peterson. Medical Devices and Human Engineering, CRC Press, New York, 2015
10. Frank E. Johnson, Katherine S. Virgo, The Bionic Human: Health Promotion for People with Implanted Prosthetic Devices, Humana Press Inc., New Jersey, 2006