Course Code : BMEG5100

Course Title : Advanced Medical Robotics

Units : 3

The course covers medical robotics fundamentals, including introduction to robotics enabled endoscopic and laparoscopic surgeries, concepts of robotics based minimal invasive surgeries and robotic technologies in Da Vinci surgical system, micro-scale robotic medical devices, robotic technologies in natural orifice transluminal endoscopic surgery (NOTES) systems, visions and image processing in medical and surgical robotic systems, introduction to rehabilitation, and prosthetic robotic technology and systems.

Course Code : BMEG5110

Course Title : Advanced Medical Devices and Sensor Networks

Units : 3

Generation mechanisms of biological signals. Principles of bioelectrical, biochemical, biophysical, and biophotonic sensors. Design of wearable medical devices for p-Health. Body area networks. BAN security issues. Multi-sensor data fusion. Wearable and implantable sensor integration. Wearable devices and sensors for monitoring, diagnosis, therapy, sports, etc. Recent advancements in medical devices, biosensors, and sensor networks.

Course Code : BMEG5120

Course Title : MEMS and Nanotechnology for Biomedical Engineering

Units : 3

Introduction to MEMS and Nanotechnology, with focus on biomedical applications. Recent developments in BioMEMS, including micro-fluidic systems, integrated DNA analysis chips, and micro-fabricated bio-detection and cell-sorting systems. Recent advances in nanoscale biomedical applications, including AFM based bio-manipulation and bio-sensing, soft-lithography for DNA, proteins and cells, self-assembly of peptides and proteins, nanoscale drug delivery systems, and bio-nano-informatics fusion.

Course Code : BMEG5130

Course Title : Biomedical Imaging Processing

Units : 3

The course introduces advanced theories, algorithms and techniques on biomedical image processing and analysis. The course content covers compressive sensing for MRI and Terahertz imaging, biomedical image reconstruction, sample characterization methods in reflection and transmission geometry, image interpolation, image deconvolution, image segmentation, and image registration. It also includes some biomedical image applications, such as Terahertz spectroscopy and diffusion tensor MRI. Students who take this course need background on signal processing and MATLAB programming.

Course Code : BMEG5140

Course Title : Rehabilitation Engineering

Units : 3

The course introduces the disabling process, aging and disabilities, congenital disabilities, the enabling process and therapeutic equipment in rehabilitation medicine. It covers assistive technologies for persons with physical disabilities, sensory disorders, communication disorders, mental disabilities, and technologies for learning, work and leisure, accessible technology and universal design. Appropriate technology for the developing regions.

Course Code : BMEG5210

Course Title : Medical Visualization

Units : 3

Visualization uses computer-generated graphics to visually analyse very complex data and communicate ideas. Medical visualization has become a very powerful tool in computer assisted diagnosis, treatment and surgery. This course will introduce the techniques used in medical visualization. Topics will include image analysis for medical visualization, algorithms of medical visualization, as well as their applications in anatomy education, surgical simulation and image-guided surgeries.

Course Code : BMEG5310 – BMEG5340

Course Title : Biomedical Engineering Seminar I - IV

Units : 1

A series of seminars related to the topics of biomedical engineering are delivered by local and oversea biomedical engineering scholars and researchers. CUHK BME postgraduate students are required to attend at least six BME seminars during one semester and write two reports on their learning from two seminars, respectively.

Course Code : BMEG5610

Course Title : Research Methods in Biomedical Engineering

Units : 3

This course presents research methods in biomedical engineering, and primarily aims at preparing postgraduate students for basic research or employment in the clinic and biomedical industries. Students will learn relevant concepts and tools for analyzing data arising from quantitative and qualitative research in molecular, physiological, and clinical systems. This course focuses on developing students' ability to analyze research data and critique the scientific literature.

Course Code : ENGG5404

Course Title : Micromachining and Microelectromechanical Systems

Units : 3

This course provides a broad overview of microfabrication and microelectromechanical systems. Topics include introduction to basic micromaching techniques such as photolithography; isotropic and anisotropic wet etching; dry etching; physical and chemical vapor deposition; electroplating; metrology; statistical design of experiments; MEMS release etching; stiction; and MEMS device testing. The course also reviews important microsensors, microactuators and microstructures. Topics include accelerometers; pressure sensor; optical switches; cantilever beams; thin-film stress test structures and bulk micromaching test structures. Lastly, the course introduces the fundamentals of central dogma of molecular biology; cell and tissue biology; and principles of transduction and measurements of molecules, cells and tissues.

Course Code : MAEG5080

Course Title : Smart Materials and Structures

Units : 3

The contents of this course include overview of smart materials technology, characteristics of smart materials such as piezoelectric materials, magnetorheological fluids, and shape memory alloys. It covers smart actuators and sensors; structural modelling and design; dynamics and control for smart structures; integrated system analysis; and applications in biomedical devices, precision machinery, transportation, and buildings.

Course Code : BMEG8006

Course Title : Thesis Research

Units : 6

In this course, a student is required to meet regularly with his/her supervisor individually and/or in small group, to receive guidance and supervision to conduct his/her thesis research and to write up his/her thesis.

http://www.bme.cuhk.edu.hk/new/mphil-phd.php Description of graduate courses