

SUBJECT DESCRIPTION FORM

Subject title: Information Technology in Biomedicine

Subject code: EIE576

Credit value: 3

Responsible staff and department: Professor David Feng and Dr Z. Chi, EIE

Pre-requisite: Nil

Recommended background knowledge:

Basic computer engineering concepts and programming experience in at least one high-level language.

Mutual exclusions: Nil

Learning approach:

Lecture/Tutorial	30 hours
Laboratory/Case Studies	12 hours

This course will encourage students creatively and innovatively to use modern information technology to solve various challenging issues in biomedicine and health care delivery. The main topics will be presented through lectures. Students are expected to do reading assignments, and demonstrate their understanding of the taught materials by solving assigned problems. Through tutorials, details on specific areas can be explained in an interactive manner. Experimental work and small projects will be given to enhance the practical experience of the students.

Assessment:

Continuous Assessment	45%
Examination	55%
Total:	100%

Objectives:

Information technology (IT) has significantly contributed to the research and practice of medicine, biology and health care. The IT field is growing enormously in scope with biomedicine taking a lead role in utilizing the evolving applications to its best advantage. This comprehensive course aims to fill the incredible need in such a blossoming field of IT in biomedicine. It is probably the only resource that provides systematic overview and comprehensive guide of enabling information technologies in biomedicine for students, IT specialists, healthcare professionals and researchers. This course will thoroughly cover a complete set of theories and techniques in biomedicine data compression, management, modelling, processing, registration, visualization, communication, security, and large-scale biological computing, etc. It also addresses a broad range of practical integrated clinical applications for disease detection, diagnosis, surgery, therapy, and biomedical knowledge discovery, including the latest advances in the field, such as ubiquitous M-Health systems and molecular imaging applications.

Keyword syllabus:

Introduction

- Background
- Current IT Applications in Hospital Environment (HIS, RIS, PACS, EPR, etc.)
- Major Activities for IT in Biomedicine
- Basic Anatomy, Biochemistry and Physiology
- Medical and Medical Imaging Data Acquisition

Section I Fundamental - Information Technologies for Biomedicine

- Image Data Compression and Storage
- Data Management and Retrieval
- Data Modeling and Simulation
- Data Processing and Analysis
- Data Registration and Fusion
- Data Visualization and Display
- Data Communication and Transmission
- Data Security and Protection
- Biological Computing

Section II Integrated Clinical Applications

- PACS and Medical Imaging Informatics (MII) for Filmless Hospitals
- Medical Digital Library (MDL) for Paperless Hospitals
- Electronic Medical Record (EMR)
- Computer-Aided Diagnosis (CAD)
- Clinical Decision Support Systems (CDSS)
- Computer-Integrated Surgery (CIS)
- Clinical and Healthcare Knowledge Management
- Molecular Imaging
- Molecular Imaging in Biology and Pharmacology
- From Telemedicine to Ubiquitous M-Health: the Evolution of E-Health Systems
- Multimedia for Future Health – Smart Medical Home

Section III

- Case Studies
- Exercises and Laboratories

Indicative reading list and references:

1. Information Technologies in Medicine, Volume I, Metin Akay and Andy Marsh (Eds), Wiley-IEEE Press, Jul 2001
2. Information Technologies in Medicine, Volume II, Metin Akay and Andy Marsh (Eds), Wiley-IEEE Press, Jul 2001
3. Information Technology for the Practicing Physician, Joan M. Kiel (Eds), Springer Nov 2000
4. Medical Informatics: Computer Applications in Health Care and Biomedicine, G. Wiederhold, et al. (Eds), Springer, Nov 2000
5. Handbook of Medical Informatics, J.H. van Bommel and M.A. Musen (Eds), Springer Jan 1997