**SUBJECT DESCRIPTION FORM**

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Information Technology in Biomedicine</th>
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<tr>
<td>Subject code</td>
<td>EIE576</td>
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<tr>
<td>Credit value</td>
<td>3</td>
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<tr>
<td>Responsible staff and department</td>
<td>Professor David Feng and Dr Z. Chi, EIE</td>
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<tr>
<td>Pre-requisite</td>
<td>Nil</td>
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<tr>
<td>Recommended background knowledge</td>
<td>Basic computer engineering concepts and programming experience in at least one high-level language.</td>
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<td>Mutual exclusions</td>
<td>Nil</td>
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| Learning approach | Lecture/Tutorial 30 hours  
Case Studies/Presentations 12 hours |
| Assessment     | Continuous Assessment 100%            |

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, small projects, case studies, and oral presentations will be given to enhance the practical experience and generic skills of the students.

**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:

1. Technological Fundamentals
   1.1 Medical Imaging
   1.2 Electronic Medical Record (EMR)
   1.3 Image Data Compression and Storage
   1.4 Content-Based Medical Image Retrieval
   1.5 Data Modeling and Simulation
   1.6 Techniques for Parametric Imaging
   1.7 Data Processing and Analysis
   1.8 Data Registration and Fusion
   1.9 Data Visualization and Display
   1.10 Data Communication and Network Infrastructure
   1.11 Data Security and Protection for Medical Images
   1.12 Biological Computing

2. Integrated Clinical Applications
   2.1 PACS and Medical Imaging Informatics (MII) for Filmless Hospitals
   2.2 Medical Digital Library (MDL) for Paperless Hospitals
   2.3 Integrated Multimedia Patient Record Systems
   2.4 Computer-Aided Diagnosis (CAD)
   2.5 Clinical Decision Support Systems (CDSS)
   2.6 Medical Robotics and Computer-Integrated Interventional Medicine
   2.7 Functional Techniques for Brain Magnetic Resonance Imaging
   2.8 Molecular Imaging in Cancer
   2.9 Molecular Imaging in Biology and Pharmacology
   2.10 From Telemedicine to Ubiquitous M-Health: the Evolution of E-Health Systems
   2.11 Multimedia for Future Health – Smart Medical Home

3. Exercises, Case Studies and Presentations

Text Book:

1. Feng (Ed), Biomedical Information Technology, Academic Press Series in Biomedical Engineering,

Indicative reading list and references:

2. Metin Akay and Andy Marsh (Eds), Information Technologies in Medicine, Volume I, Wiley-IEEE
   Press, Jul 2001
3. Metin Akay and Andy Marsh (Eds), Information Technologies in Medicine, Volume II, Wiley-IEEE
   Press, Jul 2001
5. G. Wiederhold, et al.(Eds.), Medical Informatics: Computer Applications in Health Care and
   Biomedicine, Springer, Nov 2000

June 2009