

SUBJECT DESCRIPTION FORM

SUBJECT CODE: HTI4151

SUBJECT TITLE: Biomedical Engineering Laboratories

CREDITS: 3

PREREQUISITIES: HTI2121 Introduction to Biomechanics
HTI2111 Bioelectrical Technology I
HTI3115 Bioelectrical Technology II
or equivalent

RESPONSIBLE DEPARTMENT: Department of Health Technology & Informatics

RESPONSIBLE MEMBER OF THE ACADEMIC STAFF:

Dr. Eric Tam
Other HTI Academic Staff

LEARNING APPROACH:

Contact hours:

Lecture	3 hours
Laboratory	<u>39 hours</u>
Total Contact	42 hours

Independent study hours:

Laboratory preparation and reporting	<u>80 hours</u>
Sub-total	80 hours

RATIONALE:

Biomedical engineering is an interdisciplinary subject which involves the integration of knowledge between engineering and medicine. Strong laboratory learning components are essential for students to acquire competence to practice in this emerging field. This subject provides guidance for students to develop self-learning initiatives and hand-on experiences in applying biomedical engineering principles in experimental investigations. Through the laboratory sessions, students will gain competence in using biomedical instrumentation, making measurements on living systems, testing hypothesis through experimental procedures, utilize analytical methods and modern engineering tools to make interpretation of experimental results and to articulate findings through verbal and written presentations.

OBJECTIVES:

The objectives of this subject are for students to:

- Understanding and apply basic biomedical engineering principles
- Design and conduct experimental investigations on living systems
- Develop skills in using modern engineering tools
- Acquire proper analytical skills for the interpretation of experimental data
- Appreciate the limitations of the current theoretical construction of the knowledge base
- Enhance technical reporting skills through verbal and written presentations

SYLLABUS:

The lecture of this subject will cover safety and ethical issues related to biomedical measurements; basic error estimation in experimental work and techniques in writing technical report. Laboratory experiments would include:

- Electrical safety evaluation
- Biomedical ultrasound imaging
- Medical imaging processing and visualization
- Mechanical ventilator
- Skin perfusion monitoring
- Laser application and measurements
- Blood pressure monitoring
- Nerve conduction and electromyography studies
- Electrocardiogram and patient monitor
- Electroencephalogram measurements
- Measurement of tissue properties
- Application of strain gauge in biomedical measurements
- Others

ASSESSMENT:

Continuous Assessment * 100%

** Student must complete all lab reports with satisfactory results in order to pass the course*

REFERENCE:

1. Bronzino JD. The Biomedical Engineering Handbook, CRC Press, Boca Raton, Florida, 1995.
2. Carr JJ and Brown JM. Introduction to Biomedical Equipment Technology, 4th Edition, Prentice Hall, 2001
3. David Y, von Maltzahn W, Neuman MR, Bronzino JD. Clinical Engineering, CRC Press LLC, 2003
4. Harsanyi G. Sensors in Biomedical Applications: Fundamentals, Technology and Applications, Technomic Publishing Co., Inc., Lancaster, Basel, 2000.
5. Malmivuo J, Bioelectromagnetism : Principles and Applications of Bioelectric and Biomagnetic fields, New York : Oxford University Press, 1994
6. Morris AS. Measurement and Instrumentation Principles, Butterworth-Heinemann, 2001
7. Ozkaya N and Nordin M, Fundamentals of Biomechanics: Equilibrium, Motion and Deformation, 2nd Edition, Springer 1999
8. Webster JG, Medical Instrumentation: Application and Design, 3rd Edition, Wiley, 1998