

SUBJECT DESCRIPTION FORM

Subject Code: HTI3112

Subject Title: Principles of Bioinstrumentation

Credits: 3

Pre-requisites: HTI3115 Bioelectrical Technology II – Electronics
Or EIE202 Electronic Circuits II
Or EIE204 Electronics

Responsible Dept: Department of Health Technology & Informatics

Responsible Member of the Academic Staff:

Dr. Raymond Tong

Contact Hours:

Lecture	26 hours
<u>Tutorials and laboratory</u>	<u>16 hours</u>
Total contact hours	42 hours

Rationale:

Professionals in the healthcare field often have to operate, acquire or participate in the design of bioinstrumentation. A good foundation of the what, why and how of bioinstrumentation is therefore essential for these professionals.

Learning Outcomes:

On successfully completing this subject, students will be able to:

- Handle the user and technical manuals of various types of equipment used in healthcare
- Describe and explain the principles of various bioinstrumentation devices
- Design building block for the bioinstrumentation device
- Learn and apply the design control process of bioinstrumentation device.
- Handle the measurement of force transducer, blood flow, displacement, temperature and respiratory equipment
- Understand the principles of medical imaging systems(X-ray, CT, MRI, PET, SPECT), ultrasound system, chemical biosensor, and therapeutic and prosthetic devices using electrical stimulation
- Describe the related safety issues and regulation

Syllabus:

Building blocks of bioinstrumentations, basic sensors, measurement of flow and volume of blood, measurement of the respiratory system, chemical biosensor, clinical laboratory instrumentation, medical imaging systems, ultrasound, therapeutic and prosthetic devices, design control process and safety issues.

Teaching-Learning Method:

Students will learn in lectures the principles of various components used in different biomedical instrumentations. Students will learn additional example problems in tutorial sessions. Group project will be utilized to facilitate students to apply what they learned in the class.

Assessments:

Continuous assessment:	60%
Final examination:	40%

Continuous assessment will include assignments and a group project.

Note: To pass this subject, students must obtain grade D or above in both continuous assessment and final examination.

Textbook:

Webster JG (Editor). Medical Instrumentation: Application and Design, 3rd ed., John Wiley & Sons, New York, 1998.

Reference Materials:

1. Webster JG (Editor), Bioinstrumentation, John Wiley & Sons, 2004
2. Carr JJ and Brown JM. Introduction to Biomedical Equipment Technology, 4th ed., Prentice Hall, Inc., Upper Saddle River, New Jersey, 2001.
3. Akay M (Editor), Wiley Encyclopedia of Biomedical Engineering, Wiley, 2006
4. Bronzino JD (Editor). The Biomedical Engineering Handbook, CRC Press, Boca Raton, Florida, 1995.
5. Togawa T, Tamura T, and Oberg PA. Biomedical Transducers and Instruments, CRC Press, Boca Raton, Florida, 1997.
6. Harsanyi G. Sensors in Biomedical Applications: Fundamentals, Technology and Applications, Technomic Publishing Co., Inc., Lancaster, Basel, 2000.
7. Shung KK, Smith MB, and Tsui BMW. Principles of Medical Imaging, Academic Press, Inc., San Diego, 1992.