

SUBJECT DESCRIPTION FORM

Subject Code: HTI3115

Subject Title: Bioelectrical Technology II – Electronics

Credits: 3

Pre-requisites: HTI2111 Bioelectrical Technology I – Circuits and Systems or Equivalent

Exclusion: EIE303 Electronic Circuits II

Responsible Dept: Department of Health Technology & Informatics

Responsible Member of the Academic Staff:

Dr. Yongping ZHENG

Contact Hours:

Lecture	30 hours
<u>Lab</u>	<u>12 hours</u>
Total contact hours	42 hours

Rationale:

Electronic circuits and devices are used widely in health technology. Examples include clinical equipments in healthcare facilities and myoelectric systems in prosthetics and orthotics. Bioelectrical Technology I and II aim to provide a firm foundation on electronic circuits, systems, and analog and digital devices.

Learning Outcomes:

At the end of this course, a student should be able to:

- Understand semiconductor materials, analog and digital components, and their evolution and inter-relationship;
- Understand versatile types and applications of semiconductor diode;
- Understand analog to digital and digital to analog conversion and their important applications in bioinstrumentation;
- Understand fundamental principles of microprocessors;
- Analyze basic transistor amplification circuit;
- Analyze basic logic gate circuits with diodes and transistors;
- Analyze logic circuits and circuits for registers and counters;
- Apply Boolean algebra in the logic circuit analysis and design;
- Design simple circuits and systems using analog and digital electronic components;
- Use LED and seven-segment display as digital output devices;
- Gain a hand-on experience in using A/D converters under the control of a microcontroller.
- Enhance the skills to use DC power suppliers, functional generators and oscilloscope through the laboratories.

Syllabus:

Semiconductor materials, diodes, transistors, amplifiers, integrated circuits, digital number, A/D and D/A conversions, logic elements, digital devices, programmable logic devices, microprocessors.

Teaching-Learning Methods:

Students will learn in lectures the principles of analog and digital electronic components and microprocessor and their applications in biomedical instrumentation. Real circuits, components, circuit boards are used in the laboratory sessions to enhance students' understanding of the principles. Various examples of medical devices will be introduced during the lectures of electronic devices.

Assessments:

Continuous assessment:	40%
Final examination:	60%

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

Reference Materials:

1. Beards P.H. Analog and Digital Electronics: A First Course, revised 2nd ed., Prentice Hall, New York, 1996.
2. Smith R.J. Electronics: Circuits and Devices, 3rd ed., John Wiley and Sons, New York, 1987.
3. Bignell J. and Donovan R. Digital Electronics, 4th ed., Delmar, US, 2000.
4. Boylestad R.L. and Nashelsky L. Electronic Devices and Circuit Theory, 7th ed., Prentice Hall, New Jersey, 1999.
5. Smith I.M. Hughes Electrical and Electronic Technology, 8th ed., Addison Wesley Longman Limited, England, 2002.
6. Floyd T.L., Electronics Fundamentals: Circuits, Devices, and Applications, 5th Ed., Prentice Hall, New Jersey, 2001.