University of Jordan **Department of Physics**

Course Outline: Medical Electronics

Course Code	: PHYS. 0302733
Course Title	: Medical Electronics;
Credit Hours	: 2 hr
Class Schedule	: One hour Lecture, Monday 8:30 to 9:30, and Three hours Lab, Monday 9:30 to 12:30
Duration	: 16 weeks
Semester	: First Semester 2013 / 2014
Instructors	: Prof. Kamal Al-Saleh / Accelerator Building - room 201
E-mails	: k.saleh@ju.edu.jo & kamals1950@gmail.com
Office Hours	: Sunday & Tuesday 11:00 – 12:00 a.m., or by appointment.

Course Materials:

Link: http://computersinphysics.weebly.com

References (Books):

1) Electronic Devices, By Thomas L. Floyed. Macmillan Publishing Company.
2) Electronic Circuits and Applications, by Senturia and Wedlock.
3) Circuit Devices and Systems, By Ralph Smith.
4) Electronic Circuit Analysis, by R. A. Colcalasser, D. A. Neamen, C. F. Hawkinns.

References (Websites)

http://www.hl.pc.uec.ac.jp/hays/electronics/textbook.pdf
http://www.seas.upenn.edu/~ese206/
http://www.electronics-lab.com/articles/electronics_courses.html
http://home.comcast.net/~stager21/Circuits.html
http://www.physics.uoguelph.ca/tutorials/ohm/index.html
http://ecee.colorado.edu/~bart/book/title.htm
http://findebookee.com/e/electronics-lab-manual
http://www.electronics-lab.com/downloads/schematic/013/

Course Description

This course gives a modern introduction to the basic physics of the semi-conducting devices and their application in electronic circuits. The course focuses on both AC and DC theoretical and experimental analyses of electronic circuits that contains diodes, transistors, and operational amplifiers, and indicate their experimental applications especially in the field of medical physics. Furthermore, the basics of some logic devices and their applications will be introduced. Experiments are designed to introduce various aspects of analog electronics starting from the simplest concepts such as Ohm's law and leading to practical electronic circuits including amplifiers, integrated circuits, oscillators, voltage regulators and logic gates.

Course Objectives

This course is intended for medical physics students with the following objectives in mind:

1. Providing students with a clear understanding of the physics basics of semi-conducting devices.
2. Develop a clear understanding of the electronic devices and their applications.
3. Enable students to measure and analyze digital circuits.

4. Apply Kichhoff's Laws to both AC and DC for electric circuit analysis.
5. Provide a proper practice and training on experimental methods and procedures in electronic circuit analysis in research and applications.
6. Develop the ability of students to deal with more advanced courses related to electronics and its application in research.
7. Get familiar with basic electronic measurements and instrumentation.
8. Get training on data analysis and professional style reporting and presentation.

Guides on Writing a Lab Report

Here are some guidelines to help you perform the experiments and to submit the reports:

1. Prepare for the experiment and read all instructions carefully and carry them all out.
2. Ask the demonstrator if you are unsure of anything.
3. Record actual results (comment on them if they are unexpected).
4. Write up full and suitable conclusions for each experiment.
5. If you have any doubt about the safety of any procedure, contact the demonstrator beforehand.
6. THINK about what you are doing!

Course Topics and Experiments

The course consists of number of units which discuss certain topics. Every week, a new unit will be discussed in the one-hour lecture. Following the lecture is a three hours lab, which is essentially an experimental application on the lecture's topic. The following are the suggested units and the topics in each unit.

Unit 1: *Introduction to DC Circuit Analysis and Measurements.*
Unit 2: *Introduction to AC Circuit Analysis and Measurements.*
Unit 3: *Introduction to Semiconductors and Devices - Diode.*
Unit 4: *Bipolar Junction Transistor Biasing.*
Unit 5: *Bipolar Junction Transistor Amplifier.*
Unit 6: *Field-Effect Transistor* (*FETs*) *Circuit.*
Unit 7: *Integrated Circuits and Operational Amplifier* (*Op-Amp*).
Unit 8: *Operational Amplifier Applications.*
Unit 9: *Oscillators.*
Unit 10: *Digital Integrated circuits and Logic Gates.*
Unit 11: *Diode - Transistor Logic* (*DTL*) *and Transistor - Transistor Logic* (*TTL*).
Unit 12: *Timer Circuits.*
Unit 13: *Analogue to Digital converter, and Digital to Analogue Converter.*

Evaluation :

1. Lab Reports : 30 % ;
2. First Exam : 30 %
3. Final Exam : 40 % .