The University of Jordan
School of Engineering
Electrical Engineering Department
Spring Semester – A.Y. 2020/2021

Course: **Electronics Lab – 0933368 (1 Cr. – Required Course)**

Instructor: Dr. Hani Jamleh & Eng. Sana' Al-Khawaldeh
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Office Hours: Will be posted on Teams

Course website: http://engineering.ju.edu.jo/ (Go to Electrical Engineering Department Labs)
www.elearning.ju.edu.jo

Catalog description: Rectification. Regulation and clipping. BJT characteristics. Bipolar Junction Transistor (BJT) biasing and large-signal amplification. BJT as an amplifier. FET as an amplifier. Cascaded amplifiers. Frequency response of amplifiers. Feedback amplifier. Differential amplifier. Op-Amp Applications. Projects.

Prerequisites by course: **EE 0903361** Electronics (II) (pre- or co-requisite)

Prerequisites by topic: Students are assumed to have a background in the following topics:
- Basic electronic components (diodes, transistors, Op-Amps, etc) and their characteristics.
- Amplifier analysis and design

Textbook: **Lab Manual which can be obtained from the course Website,**

References:
1. Microelectronics Circuit Analysis and Design by Donald A Neamen, McGraw-Hill Education, 4th edition, 2009.
2. Microelectronic Circuits by Adel S. Sedra and Kenneth C. Smith, Oxford University Press, 7th edition, 2015.
3. Laboratory Explorations to Accompany Microelectronic Circuits by Vincent C.Gaudet and Kenneth C. Smith, 7th edition, Oxford University Press, 2014.
4. Practical Electronics for Inventors by Paul Scherz and Simon Monk, 4th edition, McGraw-Hill Education, 2016.
5. How to Diagnose and Fix Everything Electronic by Michael Jay Geier, McGraw-Hill Education, 2nd edition, 2015.
6. Make: Electronics: Learning Through Discovery by Charles Platt, Maker Media, Inc, 2nd edition, 2015.
7. Grob's Basic Electronics by Mitchel E Schultz, 12th edition, McGraw-Hill Education, 2015.
8. Beginner's Guide to Reading Schematics by Stan Gibilisco, 4th edition, McGrawHill Education, 2018

Schedule: 16 Weeks, 10 Lab sessions (3 Hours each) plus exams

Course goals: The overall objective is to allow students to perform a set of experiments to examine the practical details and characteristics of various electronic components, and to understand how to design an electronic system using such components.

Course learning outcomes (CLO) and relation to ABET student outcomes (SO):

Upon successful completion of this course, a student will: **[SO]**

1. Be able to conduct appropriate experimentation to measure fundamental electrical parameters (including voltage, current, power, frequency, etc) in various electronic circuits that include diodes, transistors, Op-Amps, etc, and validate the fundamental theories related to such circuits. **[6]**
2. Be able to analyze and interpret measured data, and use engineering judgment to draw conclusions. **[6]**
3. Know the basics of electronics laboratory instruments (including multimeters, power supplies, function generators and oscilloscopes) and be able to properly use such instruments. **[6]**
4. Understand the requirements and pre-requisites for technical reporting, and be able to properly report experimental results. **[3]**
5. Be able to effectively function in a team in a collaborative and inclusive manner, to reach the lab goals and objectives **[5]**

Course topics: **Hrs**

1. Lab Equipment Familiarization: resistor color codes, digital multi-meter, oscilloscope, function generator, DC power supply, different voltage values (Vp-p, Vp, Vavg and Vrms), waveform period and frequency. **3**
2. Diode Characteristics and Rectification: basic properties of diodes, i-v curve, applications: diode rectifier, filter and peak detector circuits **3**
3. Diode Applications: clipper circuits, clamper circuits, diodes in logical AND and OR gates **3**
4. Zener diode characteristics and voltage regulation **3**
5. Bipolar Junction Transistor (BJT) Characteristics: identify BJT transistors using DMM. Analyze and design a BJT transistor DC biasing circuit, its operating point and characteristics of the BJT in several regions of operation. **3**
6. Bipolar Junction Transistor (BJT) Biasing and Applications: biasing circuits for common emitter and common collector circuits. Using BJT transistors as amplifiers. Using BJT transistor in logic applications. **3**
7. Metal Oxide Semiconductor Field Effect Transistor (MOSFET): DC behavior and characteristics in different regions of operation. Common source and common drain AC amplifiers **3**
8. BJT and MOSFET Amplifier Frequency Response: Investigate frequency and phase response of transistors. Measure the upper and lower cutoff frequencies of a common emitter amplifier. **3**
9. Operational Amplifier Applications (1): inverting amplifier, non-inverting amplifier, differential amplifier, adder, voltage follower, comparator. **3**
10. Operational Amplifier Applications (2): integrator, differentiator, half-wave rectifier, square-wave oscillator, sine-wave oscillator. **3**

Course Policies: Attendance is required and highly encouraged. To that end, attendance will be taken every lecture. Eating and drinking are not allowed during class, and cell phones must be set to silent mode. All exams (including the final exam) should be considered cumulative. Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes.

Academic Integrity: You are encouraged to study together and to discuss information and concepts covered in class with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this should never involve one student having possession of a copy of all or part of work done by someone else. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero on the assignment.

Teaching methodology ☐Blended ☒Online

Electronic platform(s) ☒Moodle ☒Microsoft Teams ☒Microsoft Forms ☐Zoom ☐Skype

Evaluation Methods:

Evaluation Activity		Mark	Topic(s)	Period (Week)	Platform
1.	Assignments	5		TBA	MS Teams
2.	Quizzes	5	TBA	TBA	MS Teams
3.	Projects	5	TBA	TBA	MS Teams
4.	Lab Reports	15		Weekly	MS Teams
5.	Midterm Exam	30	TBA	TBA	MS Teams
6.	Final Exam	40	All the material	TBA	MS Teams
	Total	100			

Course Requirements Students should have a computer, internet connection, webcam, account on a Moodle and Microsoft Teams software/platform…etc

Last Revised: February 2021