Syllabus
ESET 251 *Electronics*
Fall Semester 2024

Course Details

Section	Lecture	Room	Lab	Room
ESET-251-001	M,W 11 am -12:20 pm	Main 207	Thurs 2 pm – 4:50 pm	Main 207

Credits: 4.0
Prerequisites: EET 131 (DC circuits), and EET 132 (AC circuits)

Course Goals

The goal of this course is to introduce students to the fundamental concepts of semiconductor devices and operational amplifier theory. Specific semiconductor devices studied include: p-n junction and diode applications, basic power supplies, transistor theory, FET's, power amplifiers, regulators, and thyristors. Operational amplifier topics included are: differential architectures, instrumentation, active filters, inverting and non-inverting amplifiers, sensors, and oscillators. The course also has a strong focus on circuit construction, simulation and troubleshooting.

Instructor

Dr. Ralph Whaley
Office: 210 Main
Phone: 569-1768 (Office)
E-mail: ralph.whaley@cincinnatistate.edu
Office Hours: M,W: 9 am – 11 am ;
T: 10 am – 12 pm (virtual)
Th: 10 am – 2 pm;

Office Hour Policy:

Students should reserve office hour slots through the college Starfish system. Phone appointments require the student to call 513-334-7145 at the scheduled time of the appointment. If you can't find a time that works for you, just send Prof. Whaley an email and a different arrangement can be made.

Textbook

Floyd, T. L., **Electronic Devices: Conventional Current Version, 10th Edition,** Pearson, 2018, (ISBN-13 978-0-13-441444-7)

Important dates (tentative)

Exam #1:	Wednesday, October 9, 2024
Exam #2:	Wednesday, November 13, 2024
Final Exam:	Thursday, December 11, 2024
Homework	Every other Wednesday except exam weeks.
Quizzes:	Every other week, based on HW and labs.

Assignments

Quizzes and Exams

We will have three exams (two Midterms and one Final) in this course to give you the opportunity to show that you have mastered the knowledge and skills addressed. Two midterm exams have the same weight and cover roughly two halves of the course work, while the final exam is based on all class works including the lab modules. Quizzes for this class will be in-class and cover both lab and course material.

Homework Exercises

Exercises will be assigned bi-weekly throughout the term to assist you in mastering the basic course concepts. Homework will be due approximately every other Wednesday at the end of class, unless otherwise stated. Unless you have a prior agreement with the professor, any homework turned in after the due date will be downgraded by 25% for the first **3 days** (the following Monday usually). **After that, it will not be accepted**. It is strongly encouraged that any student having difficulty with homework assignments come to office hours or email the instructor with questions.

Labs and Lab Reports

All students will be working independently during the lab session. Prior to each session (except for the 1st meeting), lab materials will be posted on Blackboard. It is the responsibility of the student to print the lab handout and review the material prior to coming to lab. Most of the labs for this course also require exercises and/or calculations to be done prior to the lab meeting and all students must come to the lab prepared, which is graded. Students are also strongly encouraged to set up circuits on their digital trainers prior to the lab session as well as perform necessary circuit simulations. Not all lab work for this course will require a formal lab report. However, for those experiments which do require a lab report, it will be **due no later than 2 weeks after the completion of the lab assignment**.

Also, there are Saturday morning help sessions from 9am – noon every Saturday to assist students in any EET/ESET course. This can be used for homework help, exam study, or make up lab time. The sessions will be in Main 207 and will start the 2nd week of the semester, September 7.

Grading

The percentage weight of various evaluation components used in this course is given below:

CLASS WORK (60%)
- *Homework (15%)*
- *Quizzes (15%)*
- *Midterms (20% each)*
- *Final Examination (30%)*

LAB WORK (40%)
- *Final Lab Exam (30%)*
- *Lab Performance/Results (40%)*
- *Lab Reports (30%)*

93-100	A	72-76	C
90-92	A-	69-71	C-
87-89	B+	67-68	D+
82-86	B	62-66	D
80-81	B-	59-61	D-
77-79	C+	0-58	F

The above grade levels are assured, however, the actual grading for this course depends on actual performance of the class. In other words, an A could begin at 85, depending on the average scores of the class on all material.

Class Grade Policy

As is becoming standard for all EET courses - **A student that does not pass the lab portion of class will not pass the class regardless of their performance on class work.**

Attendance

Due to the participatory nature of this course, attendance in class activities will be required. Exceptions to this will be noted, however attendance for class will not be taken. If you will need to miss class for some reason, you should contact Prof. Whaley in advance to determine the consequences of missing class. If you need to miss a lab session for any reason, you must contact Prof. Whaley in advance and make arrangements to make up the lab before the next lab session, otherwise, you will receive no credit for the lab.

No Show Policy:

A student who enrolls but does not attend face-to-face class sessions and/or does not complete course work in online classes during the first two weeks of a 15 week course (or equivalent on flexible schedules) and does not officially drop or withdraw from the class, or withdraws from a course without having attended the class, will be designated as a "no show" (NS). Being marked a no show can have serious financial implications and cannot be reversed unless the NS is assigned in error. Consult the Cincinnati State Catalog for additional information.

Withdrawal from Course:

Students are highly encouraged to consult their instructor before dropping a course. Too often students withdraw because they incorrectly believe they are in danger of receiving a poor grade. Instructors will help students fully understand their scores and provide support to help them complete a class whenever possible. It is also important to check with an academic advisor before dropping classes. Advisors can help students understand consequences of withdrawal and avoid costly mistakes that could slow time to graduation.

Non-Attendance Leading to Administrative Withdrawal

A student who is enrolled in a course and does not attend any class session of that course for the consecutive equivalent of 20% of the total course length at any time during the semester may be administratively withdrawn from the course. For ESET 251, 20% of the course would mean missing 6 consecutive class meeting times without notification to the instructor.

College Communication:

All Cincinnati State students have a SurgeMail account. Students should check email frequently for important announcements and communications from faculty members, advisors, and service offices. Students should conduct all email communication with faculty and staff of the College using SurgeMail or Blackboard.

Information Technology Help Desk:

The College's Information Technology Services Help Desk can assist online students with technical problems related to Blackboard, email, or other College technology services. Help

Desk assistance is available at (513) 569-1234 and by email at itshelpdesk@cincinnatistate.edu.

Academic Integrity:

Ethical conduct is the obligation of every member of the Cincinnati State community. Violations of academic integrity that constitute serious breaches of ethical behavior include, but are not limited to cheating, fabrication, facilitating academic dishonesty, and plagiarism. If an instructor has reason to believe a violation of academic integrity has occurred, the Academic Integrity Violations Procedure will start in the classroom as outlined by the instructor's syllabus. Penalties imposed by the instructor are limited to those actions whose ramifications fall within the confines of the class, such as failure of the assignment or failure of the course. The instructor has the option of filing a report of the incident with the Provost for documentation purposes. Only the Provost can impose suspension or dismissal from the College.

Academic Honesty

Instances of academic dishonesty could result in an "F" for the course and a referral to the Cincinnati State judiciaries that may impose additional sanctions if warranted. Academic dishonesty includes, but is not limited to, the following examples: permitting another student to plagiarize or cheat from your work (Cheating implies dishonesty or deception in fulfilling academic requirements. Plagiarism involves the presentation of some other person's work as if it were the work of the presenter.), submitting an academic exercise (written work, printing, sculpture, computer program) that has been prepared totally or in part by another, acquiring improper knowledge of the contents of an exam, using unauthorized material during an exam, submitting the same paper in two different courses without knowledge and consent of professors, or submitting any forged documentation.

Collaboration

Students are encouraged to work together on homework assignments, however, submitting work that is not one's own is considered academic dishonesty and also teaches you nothing. If you are having any problems with any material in the class, please see Professor Whaley or contact him by phone or email.

Classroom Privacy

While it is sometimes desirable for classroom practices to be observed for the purpose of improvement of pedagogy, and such observation is sometimes required for annual faculty evaluation and for tenure and/or promotion evaluation, faculty are entitled to classroom privacy, academic freedom, and professional courtesy. Consequently, observation and evaluation of any classroom by any observer or evaluator requires the prior notification and mutual agreement of the class instructor and the observer or evaluator. Furthermore, recording of classroom activities by any electronic means, by students, other faculty, university administrators, or others, requires permission of the instructor. All students in a class must be informed if permission has been given for a class to be recorded. Under no circumstances may verbatim recording of copyrighted classroom lectures and materials by electronic or any other means (including note taking) be conducted for 1) sale, whether or not it is for educational benefit, or 2) for the educational benefit of those not enrolled in the class. This does not apply to non-verbatim notes taken by students.

Disabilities Policy

Any student with a disability necessitating accommodations prescribed by the Americans with Disabilities Act must meet with a Special Needs Counselor (Room Main 129) prior to participating in classroom or laboratory activities. The Special Needs Counselor must determine your accommodation requirements. They may be contacted at 569-1775.

Title IX:

Title IX is a federal civil rights law that prohibits discrimination on the basis of sex in the College's programs and activities. Sexual harassment, including sexual violence and retaliation, are forms of discrimination prohibited by Title IX. Staff and faculty have a **"duty to report and a duty to act"** in instances of situations or observations that would meet discriminatory and/or harassment guidelines under Title IX. If you are unsure of someone's duties and abilities to maintain privacy, ask them before speaking to them. To assure confidentiality in instances that might qualify, problems may be reported to College Counseling Services. Reports of sexual violence, assault, discrimination, or harassment may also be reported by contacting the Director of Human Resources at (513) 569-1565 or hr@cincinnatistate.edu. Incident reports may also be filed online: https://publicdocs.maxient.com/incidentreport.php?CincinnatiState.

Absence for Religious Observance

Students are permitted to request up to three days each semester for an excused absence from class for observance of a religious holiday (or to take part in organized activities conducted under the auspices of a religious or spiritual belief system) that is part of your sincerely held religious beliefs and practices.
You must notify me in writing within fourteen (14) days of the first day of instruction of this course if you plan to be absent for a religious holiday, using the eForm available at https://web3.cincinnatistate.edu/eforms/eform.aspx?preview=true&form_id=2122
You must talk to me about a process and schedule for making up required work you miss.
Additional information about this policy is on the College website
https://www.cincinnatistate.edu/catalog-academic-policies/religious-observance-policy

Additional Support Services

- You are encouraged to use support services available such as those listed below. Please call the number provided for services on Main or at other College locations as well.

✓ Tutoring Center	569-1614	Main 261
✓ Writing Center	569-1736	Main 235
✓ Math Center	569-1614	Main 228B
✓ Counseling Center	569-5779	Main 171
✓ ESL Resources	569-4769	Main 196

COVID 19

The following link contains vital information on the policies and procedures regarding COVID-19 safety at Cincinnati State. In addition, this link contains important information about CARES Act funding for students, laptop purchase and loans, and important semester dates.
https://www.cincinnatistate.edu/COVID-19#

Program Learning Outcomes:
http://www.csabank.com/ProgramOutcomes/EIT_Program_Outcomes.pdf

Specific Student Outcomes

The specific student outcomes for ESET 251 Electronics conform to the ODHE statewide TAG student outcomes as noted in the parentheses. The TAG outcomes are listed in the last page of this syllabus.

Semiconductor materials *(Outcome 1)*

- an ability to understand the characteristics of conductors, semiconductors and insulators
- clear understanding of the concept of doping, p-type, and n-type
- understand the difference between electron and hole mobility

P-N junctions *(Outcome 1)*

- understanding of the concept of a depletion region
- effect of forward or reverse biasing on the depletion width.
- understanding of basic dynamics of drift and diffusion

Diode Characteristics *(Outcome 2)*

- V-I curve under forward and reverse bias
- understand the basic diode models

Rectification *(Outcome 5)*

- use, design, and theory of full- and half-wave rectifiers
- understand the architecture and operation of a basic dc power supply
- understand the basics of Zener diodes and applications

Bipolar Junction Transistors *(Outcomes 3, 4)*

- understand the basic architecture of the BJT
- understand the basic parameters and figures of merit of the BJT
- be able to describe how a BJT can be used as a switch and a voltage amp
- understand basic biasing methods
- understand the 3 critical BJT amplifier architectures

Operational Amplifiers *(Outcome 6)*

- describe the basic architecture and operational modes
- understand the use of op-amps in inverting, non-inverting, comparator and summing architectures
- understand the concept of negative feedback and gain

Field Effect Transistors *(Outcome 7)*

- understand the basic architecture of the JFET and MOSFET
- understand the basic biasing modes
- understand the use of FETs as switches and amplifiers

Other Semiconductor Devices *(Outcomes 2,5)*

- understand the concepts and applications of thyristors, silicon controlled rectifiers (SCRs), Diac and Triacs
- gain exposure to voltage regulation and understand the basic methods of Pass and Crow-Bar approaches
- develop and understanding of the basic concepts of active filter and oscillator circuits

251 Lab *(Outcomes 2, 3, 4, 5, 6, 7)*

- enhance student skills at troubleshooting complex electronic circuits
- gain hands-on knowledge of testing electronic circuits for key parameters
- validate design and modeling work through circuit construction and design

Tentative Schedule – Fall 2024

Week	Course Material	Text	*Lab*
Week #1	Intro to semiconductors, pn junctions, diode theory	Chapter 1,2	*No Lab*
Week #2	Diode applications, unfiltered rectifiers	Chapter 2 **HW#1 Due**	*DC/AC Review* *Diode Characteristics*
Week #3	Filtered rectifiers, Zener diodes, LEDs	Chapter 3 **Quiz #1**	*Diode Applications and Rectifiers*
Week #4	Introduction to BJTs, transistors as switches	Chapter 4 **HW #2 Due**	*Transformer review and unfiltered rectifiers*
Week #5	Transistor biasing	Chapter 5 **Quiz #2**	*Zener Diodes and BJT characteristics*
Week #6	Common emitter and common collector amps	Chapter 6 **HW #3 Due**	*Transistor switching*
Week #7	Intro to Op-amps, multi-stage amps, negative feedback. **Exam 1**	Chapters 6 and 12	*Transistor biasing*
Week #8	Comparators, summing amps, level detectors	Chapters 12 and 13 **HW #4 Due**	*Op-amps, Inverting and non-inverting amps*
Week #9	Introduction to JFETs, JFET and MOSFET biasing.	Chapters 8 and 9 **Quiz #3**	*Comparators, level detectors, summing amps*
Week #10	FETs as switches and amps,	Chapter 9 **HW #5 Due**	*FET biasing*
Week #11	Power amplifiers, frequency analysis	Chapters 7 and 10 **Quiz #4**	*JFET as amplifiers*
Week #12	Thyristors, SCRs, Diac, Triac **Exam 2**	Chapter 11	*Thermal Sensor Lab*
Week #13	Special Voltage Regulators, 3 terminals, Pass, Crow-Bar	Chapter 17 **HW #6 Due**	*Power amps, Class A, B, AB*
Week #14	Active Filters	Chapters 15&16 **Quiz #5**	*Lab Exam*
Week #15	Review **Final Exam**	Various	*Make-up Lab*

Specific ODHE TAG Student Learning Outcomes (OET 005)

1. Demonstrate an understanding and working knowledge of semiconductor properties.*
2. Identify common and special purpose diode types and their operations. Utilize diodes and special purpose diodes in an electrical circuit.*
3. Demonstrate an understanding and working knowledge of BJT biasing circuits, positive and negative feedback, circuits stability, and frequency response.*
4. Design and build BJT amplifier circuits, including multi-stage and power amplifier circuits, to meet specifications.*
5. Demonstrate an understanding and working knowledge of oscillators, voltage regulators, and power supplies.*
6. Demonstrate an understanding and working knowledge of Op-Amps. Design and build Op-Amps circuits for various applications.*
7. Demonstrate an understanding and working knowledge of Field effect transistors (FETs), JFET and MOSFET circuits and applications.*

ESET 251 Syllabus Confirmation

I have read the syllabus for EET 251 Electronics, given to me on August 26, 2024 and fully understand what is required of me in this course. In particular I am aware of the following important points:

1) Homework grades are reduced 25% for being late, and will not be accepted after 3 days past the due date (the following Monday).

2) My lab day and time is _____.

3) I am required to be at all class sessions and lab sessions unless notifying the instructor **BEFORE** the start of the class or lab session. If I have to miss an exam, I must get the instructor approval **BEFORE** the date of the exam. Failure to provide adequate notification may result in the inability to make up the missed work.

4) I am responsible for all missed lectures and work – it is not the responsibility of the class or lab instructor to ensure that I have completed this work.

5) If I do not pass the lab, I will not pass the class.

6) If I am having any problems understanding material in the class, it is my responsibility to get help from the instructor. I am aware of the office hours of the instructor and know that he is available for help during that time. If those times do not work for me, I will contact the instructor to make alternate plans. I also am aware that I must make all office appointments through the Starfish system or by contacting the professor directly via email.

7) All communication in this course will be done through my Cincinnati State email account. I do not expect the instructors to find me using my personal email, phone number, or any social media site.

8) All emails to instructors in this class, or to any class really, are to be professional, respectful, grammatically correct, and specifically outline the problem. I am aware that the instructor may not respond immediately to my emails, but will try to respond within 1 day.

9) Although I may work with other students on HW and pre-lab assignments, I am responsible for my own knowledge of the material and work turned-in must reflect my own effort on the assignment.

10) I realize that to be successful in this class, it is crucial to not start assignments at the last moment – my instructor may not be available for help the evening before the assignment is due.

Read and understood by,

Student name: _____

Student signature: _____

Date: _____