Physics of EE
EEL 3008   Section 0001
Class Periods: Monday, Wednesday, Friday: 10:40AM – 11:30AM (Period 4)
Location: CSE E121
Academic Term: Spring 2024

Instructor:
Yingying Wu, yingyingwu@ufl.edu, LAR 213
Office Hours (In person): 12-1 pm, Wednesday, 213 Larsen

Undergraduate Peer Instructors (UPI's)
Charlotte Smith charlotte.smith@ufl.edu
Jarid Cohen jaridcohen@ufl.edu
Office Hours (Online, Zoom):   See Canvas
Graduate Student Teaching Assistants (TAs)
Brenden Mears mearsb@ufl.edu
Office Hours (Online, Zoom):   See Canvas

Course Description
An introduction to the fundamental physics underlying components and devices and their application to electronics, power, and wireless. Credits: 3

Course Pre-Requisites / Co-Requisites
EEL 3111 Circuits I, MAC 2313 Calculus III, MAP 2302 Elementary differential equations, CHM 2045 General Chemistry I

Course Objectives
The objective of this course is to provide an understanding of the physics behind electrical components, systems, and applications.

Materials and Supply Fees
None (*however, see Required Textbooks and Software below*)

Professional Component (ABET):
This course consists of 3 credits of Engineering Science

Relation to Program Outcomes (ABET):

Outcome	Coverage[*]
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium. Examples: understanding and application of equations that describe the physics of conductors, capacitors, resistors, pn junctions, transistors, and electromagnetic waves

Required Textbooks and Software
There is no required textbook. However, this class requires ~$290 in electronic devices (Analog Discovery Board, electronic parts, breadboard, etc.) as described here:
https://ufl.instructure.com/courses/473695/pages/required-course-materials

Recommended Materials
The lecture slides (non-annotated) and online links will be the primary reference material for this class.
Students are strongly encouraged to print out the lecture slides, full-size and in color or use a tablet and take notes as we progress through the lecture material.

Course Schedule
I. How do electrical components work at a fundamental level? (~3 weeks)
   a) How a resistor works   *Project 1 – Thermistors and Photoresistors*
   b) How a capacitor works   *Project 2 - Capacitors*
   c) How an inductor works
   d) How a transformer works
II. How do power systems work? (~3 weeks)
   a) How motors/generators work   *Project 3 – Motors/Generators*
   b) How is power generated and distributed
   c) Why 3-phase ac power?
III. How do solid-state (semiconductor) devices work? (~3 weeks)
   a) How a diode works   *Project 4 – Diodes*
   b) How a MOSFET works
IV. How are semiconductor devices used in electronic circuits? (~3 weeks)
   a) How diodes are used   *Project 5 – Diode Applications*
   b) How an amplifier works (analog circuits)
   c) How digital logic works (digital circuits)   *Project 6 – MOSFETs*
   d) Why does computation take time and consume power?
V. How do radios and cellphones transmit and receive (~2 weeks)
   a) Propagating electromagnetic waves
   b) Transmission/reception of electromagnetic waves using an antenna

Attendance Policy, Class Expectations, and Make-Up Policy
This class will be taught *synchronously* in the Computer Science & Engineering building E121 MWF (10:40am). Attendance quizzes will be assigned with each lecture due 5 minutes after the start of class to help keep on track with the flow of the course.

Online office hours and help sessions will be scheduled during scheduled class times as well as other various times throughout the week. These portions of the class may be presented using Zoom, which requires a webcam and stable internet connection. During live, interactive zoom meetings, I prefer that students keep their camera on during the class so that I can see you as I would during normal face-to-face classes. However, this is not a requirement.

Excused absences must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Evaluation of Grades

Assignment	Percentage of Final Grade	Dates
Attendance Quizzes (~30)	10%	~2-3 per week
Homework (~11)	15%	~Weekly
Projects (~6)	15%	
Tests (3)	60%	2/16, 4/05, 4/26
TOTAL	**100%**	

Grading Policies

Grading Scale

Numeric Cutoff	Letter Grade	Grade Points
90.00	A	4.00
86.67	A-	3.67
83.33	B+	3.33
80.00	B	3.00
76.67	B-	2.67
73.33	C+	2.33
70.00	C	2.00
66.67	C-	1.67
63.33	D+	1.33
60.00	D	1.00
56.67	D-	0.67
<56.67	E	0.0

Late Submission Policy
All assignments are due at 11:59 pm on the due date. A deduction of -20% if submitted within 24 hr, and 40% if submitted within 48 hr. Zero credit after 48 hr late.

Tests
There is no allowance for taking a test late. Makeup tests are contingent on appropriate justifications and legal documents (UF Dean of Students, certified physician, military paperwork, jury summons, etc.)

Drops
There is currently no intention to allow "drops" of assignments such as quizzes, homeworks, projects, etc. However, the instructor reserves the right to allow for drops of assignments, which, if enacted, would only serve to benefit a student's grade.

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment
The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
• Your academic advisor or Graduate Program Coordinator
• Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
• Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
• Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules,

disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

<u>Health and Wellness</u>

Covid-19 Protocols:
You are expected to wear approved face coverings at all times during class and within buildings, even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: http://www.counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

<u>Academic Resources</u>

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://career.ufl.edu

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus: https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/; https://care.dso.ufl.edu.

On-Line Students Complaints: http://www.distance.ufl.edu/student-complaint-process.