Physics of EE
EEL 3008   Section 2260   Class# 12083
Class Periods: MWF 2 (8:30am – 9:20am)
Location: Online
Academic Term: Fall 2020

Instructor:
David Arnold
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LAR 213
Office Hours (online):   TBD

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Christopher Stauffer
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Office Hours (online):   TBD

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 ~$225 in electronic devices (Analog Discovery Board, electronic parts, breadboard, etc.) as described here:
https://ufl.instructure.com/courses/406559/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, 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? (~2 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? (~2 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 (~3 weeks)
       a) Propagating electromagnetic waves
       b) Transmission/reception of electromagnetic waves using an antenna

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Online Course Recording
Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Attendance Policy, Class Expectations, and Make-Up Policy

The class will be taught "asynchronously," which means that although the course is scheduled with the registrar for MWF 2 (8:30am), you will not be expected or required to wake up/attend at 8:30am. All lectures and course content will be available for you to watch at your leisure. However, students are expected to keep on track with the flow of the course. A quiz (with due date) will be assigned with each lecture to help keep pace.

Various (online) office hours and help sessions will be scheduled at more convenient times. These portions of the class may be presented using Zoom, which requires a webcam and stable internet connection. During live 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. Studies show that if we can see each other's faces then we will have more engagement, more student success, and more faculty success. However, this is not a requirement. I understand if

on certain days you can't have your camera on due to internet bandwidth limitations, other family members, health issues, or any other reasons.

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
Quizzes (~30)	10%
Online Interactions	5%
Homework (~10)	15%
Projects (~6)	10%
Tests (3)	60%
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/.

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/policies/student-honor-code-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 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/cwc, 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/.

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://www.crc.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://care.dso.ufl.edu.

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