1. Catalog Description

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

2. Pre-requisites and Co-requisites

EEL 3111 Circuits I, MAC 2313 Calculus III, MAP 2302 Elementary differential equations, CHM 2045 General Chemistry I

3. Course Objectives

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

4. Contribution of course to meeting ABET professional component

3 hours engineering science

5. Relationship of course to ABET program outcomes

a - an ability to apply knowledge of mathematics, science, and engineering: understanding and application of equations that describe the physics of conductors, capacitors, resistors, pn junctions, transistors, and electromagnetic waves

6. Instructors: Dr. Allen Turner and Dr. David Arnold

Dr. Allen Turner
a) Office location: NEB 227
b) Office hours: MW 3:00 – 4:00 pm or by appointment
c) Telephone: (352) 392-2652
d) E-mail address: turneral@ufl.edu
e) Web site: http://elearning.ufl.edu/

Dr. David Arnold
a) Office location: LAR 213
b) Office hours: MWF 9:25-10:25 am or by appointment
c) Telephone: 352-392-4931
d) E-mail address: darnold@ufl.edu
e) Web site: http://elearning.ufl.edu/

7. Teaching Assistants:

Jackson Carroll
a) Office location: NEB 222
b) Office hours: TBA
c) E-mail address: jacksonecarroll@ufl.edu

Wes Piard
a) Office location: NEB 222
b) Office hours: TBA
c) E-mail address: wespiard@ufl.edu
8. **Meeting Times**
   MWF 4 10:40-11:30 am

9. **Meeting Location**
   Pugh 170

10. **Laboratory Schedule**
    None

11. **Material and Supply Fees**
    None

12. **Textbooks and Software Required**
    a) Title:  * Note 1: No textbook exists currently
    b) Author: 
    c) Publication date and edition:
    d) ISBN number:

    Other: Analog Discovery Board (sold by either National Instruments or Digilent)

13. **Recommended Reading/Videos**
    Handouts, links, and videos on Canvas

14. **Course Outline** (approximate)

   I. How do components work at a fundamental level? (3 Weeks)
      i. How a resistor works
      ii. How a capacitor works
      iii. How an inductor works
      iv. How a transformer works

   II. Application to power (2.5 Weeks)
      i. How motors/generators work
      ii. Why ac 3-phase power
      iii. How is power distributed

   III. How do solid-state devices work? (2.5 Weeks)
      i. How a diode works
         1. Example rectifier
         2. Example solar cell, photodiode
         3. Example LED
      ii. How a MOSFET works
         1. Example switch

   IV. Application to electronics (1.5 Weeks)
      i. How does an amplifier work
      ii. How does digital logic work

   V. Application to computing (1 Week)
      i. Why does computation take time
ii. Why does computation consume power (and drain the battery)

VI. How do radios and cellphones transmit and receive (4.5 Weeks)

i. Propagating E&M waves
ii. Transmission of waves using an antenna (radiation from a small dipole antenna)

15. Attendance and Expectations

It is understood that all attendees will be focused on the lecture and will take every possible measure to minimize distractions for everyone (i.e. no newspapers, no cell phones, no electronics, no laptops, etc. unless instructed to use them for class). Students may not depart early from class unless approved in advance.

16. Grading – methods of evaluation

The score, \( S \), for the course will be determined by combining the average scores, out of 100, on Daily Quizzes, \( Q \), Homework, \( H \), In-Class/Take-Home Projects, \( P \), and Tests, \( T \), with

\[
S = qQ + hH + pP + tT
\]

where \( q, h, p \) and \( t \) are determined as follows.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Formula</th>
<th>Max. Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Q &gt; T )</td>
<td>( q = 0.10 )</td>
<td>( 0.2 )</td>
</tr>
<tr>
<td>( H &gt; T )</td>
<td>( h = 0.15 )</td>
<td>( 0.3 )</td>
</tr>
<tr>
<td>( P &gt; T )</td>
<td>( p = 0.15 )</td>
<td>( 0.3 )</td>
</tr>
<tr>
<td>( T )</td>
<td>( t = 1 - q - h - i )</td>
<td></td>
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a) Daily Quizzes: Daily (except when class attendance exceeds 90% at the start of class—10:40 am)
   At least the lowest 10% of Daily Quiz scores will be dropped

b) Homework: ~9 Assignments – submitted on paper

c) In-class/Take-home Projects～6 Projects – submitted as PDF via Canvas
   i. Students will be assigned activities that complement and reinforce the theory taught in lecture.
   ii. These activities will include measurements on electrical components using a portable USB-based electrical engineering laboratory kit (Analog Discovery Board).
   iii. Students will turn in screen capture demonstrating results.

d) Tests: There will be two evening tests on February 16 and March 30 both starting at 7PM, and a final exam on April 27 from 3PM-5PM. There will be no class held on Friday February 17 or Friday March 31.

e) Pop Quizzes: Pop quizzes can occur at any time, however, they will occur whenever the instructor deems that the class is not prepared to start on time, if any student is using a computer, cell phone, iPod, iPad, etc., reading a newspaper, socializing or otherwise being rude, disrespectful or disruptive during class.

Any student causing a pop quiz will receive a zero on the pop quiz, and any student responsible for multiple pop quizzes will, at the instructor’s discretion, receive a zero for their overall pop quiz score. Each pop quiz will count 2% of the overall score, the remaining portion of the overall score will be weighted as shown in the table below.

An overall score, \( OA \) will be tabulated for each student based on the average pop quiz score, \( PQ \), the number of pop quizzes, \( N \), along with the score, \( S \), according to the formula below

\[
OA = S(1 - 0.02N) + PQ(0.02N)
\]

f) Late Submissions: Homework and Project submissions are due at beginning of class period (10:40 am) on the due date. Late assignments will receive a 20% deduction for first day late (10:40 am following business day), and an
additional 30% deduction (50% total) for second day late (10:40 am following business day). No assignments accepted after 2 business days late. **LATE ASSIGNMENTS MUST BE SUBMITTED TO THE TA** (not faculty member). It is the student’s responsibility to find and deliver the late assignment to the TA.

17. **Grading Scale:**

Grading Scale: ≥92.5 A, ≥90 A-, ≥87.5 B+, ≥82.5 B, ≥80 B-, ≥77.5 C+, ≥72.5 C, ≥70 C-, ≥67.5 D+, ≥62.5 D, ≥60 D-, <59 E

Examinations may be curved to an average of 75 with no score > 100.

18. **Make-up Exam Policy**

Makeup exam is contingent on appropriate justifications and legal documents (UF Dean of Students, certified physician, military active duty, judge for jury duty, etc.)

19. **Students Requiring Accommodations**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [https://www.dso.ufl.edu/drc](https://www.dso.ufl.edu/drc)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

20. **Course Evaluation**

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at [https://evaluations.ufl.edu/evals](https://evaluations.ufl.edu/evals). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at [https://evaluations.ufl.edu/results/](https://evaluations.ufl.edu/results/).

21. **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://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/](https://www.dso.ufl.edu/sccr/process/student-conduct-honor-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.

22. **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.

23. **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: [http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html](http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html)

24. **Campus Resources:**
Health and Wellness

**U Matter, We Care:**
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

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

**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/](http://www.police.ufl.edu/).

Academic Resources

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

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. [https://www.crc.ufl.edu/](https://www.crc.ufl.edu/).

**Library Support**, [http://cms.uflib.ufl.edu/ask](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/](https://teachingcenter.ufl.edu/).

