Physics 370: Electronics

Fall 2023

Lecture: A113 SCI, Mon, Wed, Fri., 1:00-1:50

Lab: A012 SCI, Thur. 12:00 – 1:50 (in basement!) ….and we need to find another hour!

Instructor: Chris Verzani
E-mail: cverzani@uwsp.edu
Office: SCI B103
Office Hours: Mon. 12:00 – 12:50, Tues. 10:00 – 10:50,
Th, 3:00 – 3:50, Fri. 10:00 – 10:50
Or by appointment
Text: Electronics: A Complete Course, Nigel P. Cook, 2nd Edition

Policies

Attendance: Although attendance is not recorded for the lectures, it is highly recommended that you attend. Regular attendance will help you learn the material and, thus, lead to better performance on quizzes and exams. Laboratory attendance is required to receive a laboratory grade. Although the laboratory exercises are generally performed in groups of two, each student *must attend* the lab in order to receive a grade for the lab.

Although the timetable lists the course as having three separate hours of lecture and one three-hour lab per week, there will not always be an equal division of lab and lecture time on any given week. In other words, some days may be devoted more to lecture while other days are devoted entirely to lab. You are expected to complete the laboratory exercises during the scheduled times for labs (and/or lectures). Make-up labs are possible; however, they are usually less enjoyable since they are performed alone. It is your responsibility to contact the instructor if you need to schedule a make-up lab.

Course Goals: The course is basically separated into **three distinct parts**. Although you will likely learn many new concepts pertinent in electronics, it's fair to state that this course is less of a **theoretical** study of electronics, and much more an **applied** "hands-on", laboratory-based course. This course has a strong emphasis on learning how to "do electronics" in the laboratory, and primary course goals are to be actively engaged in applied electronics design, construction, and circuit testing ("de-bugging").

The first third of this semester, as we will be mostly covering material that you have had some familiarity with from a 2nd semester introductory physics course (PHYS 250), it will likely feel new again, with the lab-based emphasis. Familiar subjects, such as circuits with combinations of resistors, capacitors, and inductors will be covered, but will be covered in greater detail (though not necessarily with much greater depth). This section of the course is essentially "**analog**" circuitry.

The second part of the semester will emphasize **digital** circuitry. This includes subjects such as diodes, transistors, and integrated circuits (IC's), and again, emphasis will be applied, lab-based learning.

The final part of the semester is dedicated entirely to **projects**. When working on your projects, you will get the opportunity to take what you've already learned and use it to create something new! The goal is for you to pick out an area of electronics that is of particular interest to you and apply the concepts you've learned in either or both of the first two parts of the semester to create a circuit that performs some type of task. (For example: A solar panel that rotates to follow the suns path across the sky). Specific details for this part of the course will be given later in the semester.

Learning outcomes:

1.) Integrate conceptual reasoning, critical thinking skills, mathematical skills, and principles to explain and solve problems related to many different types of electric circuit designs covered in this course. This includes taking quizzes, exams, turning in pre-lab exercises, and in the laboratory through exercises where you successfully construct many different electronic circuits.

2.) Investigate experimentally by identifying how to create functioning circuits. Also, you will use the circuits to make measurements, collect reliable data, analyze results, and draw justifiable conclusions. Labs reports and worksheet will be completed to satisfy this outcome.

3.) Communicate effectively by clearly writing out an explanation of how and why your circuits operate, and in some cases why your circuits may not be performing as you may have expected prior to construction. Justifiable conclusions about circuit performance should be drawn and explained in lab reports.
Effective communication will also occur when you design and build your own circuit, as a lab project, and formally present the results of your project to the class. (More information under "Projects" below).

Canvas: A great deal of information about this course will be posted on Canvas. Some of these items: grades, some lecture notes, deviations from the course calendar, etc..

E-mail: Any notices to the class will be sent via e-mail, so it is a good idea to check your UWSP e-mail regularly.

Grading: Grades are calculated based on the scores of quizzes, lab worksheets, and exams. The final percent grade will be calculated as follows:

final grade percentage = (your total quiz points)/(total possible quiz points)*20% + (your total lab points)/(total possible lab points)*40% + (your total exam points)/(total possible exam points)*40%

Letter grades are determined by calculating the final grade percentage (see above), and then using the table shown below.

A	94.0% or higher
A-	90.0% or higher
B+	86.0% or higher
B	83.0% or higher
B-	80.0% or higher
C+	76.0% or higher
C	73.0% or higher
C-	70.0% or higher
D	60.0% or higher
F	Less than 60%

It is anticipated that the number of points for the various parts of the course will be roughly as follows:

Quizzes:	7 x 10 points = 70 total points
Exams:	4 x 30 points = 120 total points
Labs:	10 x 12 points = 120 total points

(Note: The total number of quizzes and laboratories many be different that shown above, but the weightings will not change. So, for example, all quizzes will count for 20% of your grade regardless of the actual total number of quizzes)

Homework: Although assigned homework problems are not collected or graded, answering the questions at the end of each chapter should help increase your scores on quizzes and exams. The answers to the odd-numbered questions are given in the back of your textbook. Discuss any difficulties you have answering these questions with the instructor during office hours or, if there is time, during your lab session.

Exams: The weeks of the three written exams are on the course schedule (The exact dates are tentative). You should bring a basic scientific calculator, pencil, and eraser to the exams. You should not bring any notes or books. Make-up exams are possible at the instructor's discretion. (Note: There is **no final exam**. Instead, **your project presentation counts as your final exam score.**)

Laboratory: There is no lab manual for this course; instead, you will be given lab handouts each week**.** Occasionally the lab handouts refer to figures from the textbook. The textbook is also a valuable reference, and (even though it's a heavy book) it's recommended that you **bring** a **textbook** with you **to lab**.

Projects: During the last two-three weeks of the course, students will work on projects (including; design, construction, and circuit testing). Each group will determine an appropriate project in consultation with the instructor. Each group will give a graded presentation on their project during the final exam period. The number of points for the project will be the same as for a midterm exam.

You will write and submit a proposal for the project circuit you want to build. Projects will have a budget requirement, so you need to include circuit parts needed for your circuit. The final presentation will summarize your project results. In each your presentations, explanations of your circuits should be included, as well as circuit diagrams, and discussion of circuit testing, results, and a clear summary. Furthermore, each student will be given evaluation forms to critique the presentations of other students. These evaluations are to provide effective and useful feedback, but will not have any influence on grades for presentations.

Quizzes: Most weeks you will be taking a quiz based on material covered the previous week. Quizzes are based on material from your textbook, lectures, and lab exercises. Questions will resemble those at the end of each chapter, on the textbook website, and on your lab worksheets. You should have a basic scientific calculator, pencil, and eraser for the quizzes; but you may not use any notes or the textbook.

Schedule

Week	Lecture/Lab Topics	Chapters
9/05	Current, Voltage, Resistance, & Power	1 & 2
9/11	Series & Parallel Circuits	3, 4, & 5
9/18	Capacitors & RC circuits	6 & 7
9/25	Inductors & RLC circuits	8 & 9
10/02	Semiconductors & Diodes	10
Exam 1 Ch. 1-9		
10/09	Diodes	11
10/16	Transistors	12
10/23	Op-Amps	15 (part 1)
10/30	Timers and Clock Generators	15 (sect. 3)
Exam 2 Ch. 10, 11, 12, & 15 (sect. 1)		
11/06	Number Systems and Codes & Logic Gates	17 & 18
11/13	Logic Circuit Simplification	19

11/20	Projects (instructions)	
11/27	Projects?	
12/04	Projects	
12/11	Projects	
Exam 3 Ch. 15 (sect. 3), 17, 18, 19, & 28		
Project Presentations: during the "final exam" period 12/19/2021, Tuesday, from 12:30 -2:30, Room To be determined. Probably in the lab.		