Course Syllabus  
TEL 240 - Electronics Technology  
Spring 2011

Department of Technology  
State University of New York College at Oswego

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Course Description

Electronics have become an integral component of our daily lives. We interact with systems that control our home and work environments, communications, entertainment, energy, and transportation systems. Our reliance on these systems has improved our quality of life while extending our capabilities. Much of the growth and development of human capabilities and knowledge over the past century has been as a result of technological innovations and development in the area of electronics.

In this course, students will gain an understanding of the theory and function of electronic devices and how they interact in electronic circuits. A wide variety of topics will be covered including DC and AC circuits, analog circuits, digital systems, LASERs, microcontrollers, electronic quantities and measurement, circuit prototyping, and circuit board production.

Instructional Methodology

This course will have an emphasis on hands-on learning. Approximately 75% of the coursework will be completed through laboratory activities with the remaining 25% through classroom instruction.

Students will complete laboratory activities known as Knowledge and Skill Builders (KSBs) will be completed by students to develop their understanding of electronics. This knowledge will be applied with laboratory circuit building, design problems, and troubleshooting problems.
Student Objectives

At the end of the course, the student will be able to:

1. Explain the relationship between current, voltage, resistance, and power with DC/AC circuits.
2. Solve basic electronic problems involving current, voltage, and resistance in DC/AC circuits.
3. Use a multimeter to measure current, voltage, and resistance in DC/AC circuits.
4. Convert from one prefix to another and work with powers of ten.
5. Explain the operation and purpose of various electronic components.
6. Discuss the relationship between electricity and magnetism.
7. Demonstrate proper safety practices when working with test equipment on lab experiments and projects.
8. Construct and experiment with basic DC/AC electronic circuits using schematic diagrams.
9. Use an oscilloscope to measure voltage, amplitude, and frequency of an AC signal.
10. Construct a project that utilizes the theory, test equipment, and proper printed circuit board fabrication techniques.
11. Demonstrate a basic understanding of the concepts involved in residential wiring.
12. Describe the properties that classify materials as semiconductors.
13. Describe how various semiconductor devices are constructed.
14. Explain how various semiconductor devices operate.
15. Identify the schematic symbols associated with the more commonly used semiconductor devices.
16. Recognize the more commonly used semiconductor packages.
17. Handle sensitive semiconductor devices.
18. Test various semiconductors to determine whether they are operating properly.
19. Identify and explain the operation of functional blocks of a DC power supply.
20. Identify and describe the operation of commonly used oscillator circuits.
21. Identify and describe the operation of commonly used wave shaping circuits.
22. Define and describe the characteristics of the four classes of lasers, relating applications in areas of communication, medicine and manufacturing and indicate safety principles associated with each.
23. Assemble and experiment with basic linear electronic circuits using schematic diagrams.
24. Use various test equipment to analyze the operation of linear electronic circuits.
25. Discuss the operation and application of the binary number system.
26. Convert between the binary and decimal number system.
27. Explain the operation of the basic logic gates.
28. Identify how logic gates are used in digital electronics.
29. Discuss the advantages of using digital circuits in electronic products and equipment.
30. Explain how digital electronics has contributed to the growth of the microcomputer.
31. Identify how a microcomputer/microcontroller is organized and operates.
32. Identify how microcomputers/microcontrollers have been applied to the technology that surrounds everyday life.
Textbooks and Supplies

- Safety Glasses
- Calculator (A basic solar powered calculator is recommended, cellular phones may not be used)
- 3 Ring Binder (2” Recommended) with dividers for the Lab Notebook
- Active computer and email account on the campus network

Materials Fee & Course Costs

Students are charged a $25.00 materials fee as part of this course to cover the cost of consumables used in the lab. These components are used as part of the circuit fabrication project and may include PC Board material, etchant, components, solder, and other supplies.

Additional materials may need to be purchased independently for projects as part of this course. These may include display materials, paper, components, software, or other resources.

Grading

Evaluation will be through the use of laboratory projects, laboratory skills exams, design challenges, and written theory exams as outlined below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Assignments</th>
<th>Value</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSBs</td>
<td>20</td>
<td>20 Points</td>
<td>400 Points</td>
</tr>
<tr>
<td>Projects</td>
<td>7</td>
<td>25 to 100 Points</td>
<td>400 Points</td>
</tr>
<tr>
<td>Lab Practical Exam</td>
<td>1</td>
<td>100 Points</td>
<td>100 Points</td>
</tr>
<tr>
<td>Unit Exams</td>
<td>3</td>
<td>100 Points</td>
<td>300 Points</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>1200 Points</td>
</tr>
</tbody>
</table>

Grade Calculation will be based on the percentage of points earned to the total points possible. The percent grade will then be converted into a letter grade with the following grade ranges:

- A 93% - 100%
- A- 90% - 92%
- B+ 87% – 89%
- B 83% - 86%
- B- 80% - 82%
- C+ 77% – 79%
- C 73% - 76%
- C- 70% - 72%
- D+ 67% – 69%
- D 63% - 66%
- D- 60% - 62%
- E Below 60%

Student Work Expectations

Students are expected to complete all of the activities assigned as part of the class. Ample laboratory time will be given to complete hands-on laboratory activities during lab time. Leaving class early and not utilizing the full class period will result in significant loss of valuable lab time. Written homework will not be assigned. Instead, students will be expected to complete portions of laboratory assignments outside of class. Calculations, research, and reading can be completed outside of class to allow you to better utilize laboratory time.

Due Dates

Every laboratory and homework assignment has a due date marked on the daily calendar. Assignments may be turned in at any time prior to the due date. Work will be accepted only during scheduled class times. Assignments will be accepted up to the end of class or other time specified by the instructor on the day that they are due. Work will not be accepted after the due date.
**Knowledge and Skill Builders - KSBs**

A major component of your course grade will be earned through the completion of short laboratory assignments known as Knowledge and Skill Builders or KSBs. KSBs are designed to allow you to demonstrate and experience the theoretical concepts covered in lecture and in-class demonstrations. These will assist you with understanding electronic concepts while developing skills such as electronic measurement, building and troubleshooting circuits, reading schematics, and documentation.

Many of the KSBs have components such as calculations or research that should be completed outside of lab time prior to completing the hands-on portions. This will allow you to utilize laboratory time as efficiently as possible. Many of the KSBs require that you demonstrate that a circuit functions properly to receive credit for completing the assignment. You will need to obtain the instructor’s signature on the lab. It is your responsibility to obtain the signature. If you turn in a lab without the signature, you will not receive credit for the lab.

**Graded Projects**

Graded projects will be completed to create products that the student will take with them at the end of the semester. These projects will include basic construction projects through advanced design projects. The point value assigned to each project represents the amount of time and effort required to complete them. Each project will have a handout with the specific grading criteria.

**Electronics Notebook**

Students will be required to maintain an Electronics Notebook as part of the course. This will include completed laboratory work, technical documentation, written papers, and research materials. The intention of this assignment is threefold. First, this will provide documentation of the work that you complete as part of coursework. Second, this will generate a technical resource on electronic technologies for you to take with you. Third, this will be an exercise in organizing and preparing a technical notebook. The requirements are included in on the back of the course syllabus.

**Exams**

The class will have three written unit exams and one laboratory proficiency exam. Each of these exams will cover theory from class reading, lectures, and laboratory activities. The proficiency exam will require the student to demonstrate basic electronics skills such as circuit construction, measurement, component identification, and circuit troubleshooting.

There will be no makeup exams given for missed exams. Exams will only be given at the time assigned by the instructor. The only exception will be in cases of extenuating circumstances and with prior arrangements made with the instructor.

The final exam time slot will be used for the third of three unit exams. The final exam time is on the daily plan.

**Laboratory Safety**

Students will be expected to wear safety glasses in the laboratory when using equipment, tools, or materials that may be hazardous. This includes activities such as soldering, chemical processing, machining, drilling, or cutting. Safety glasses can be purchased at most hardware stores or through the department office. Students with prescription glasses will need side shields or goggles over their glasses.
Some activities may require clothing or hair restraints. Long pants are suggested. Closed shoes are required.

**Food and Drinks will not be allowed in the lab or classroom for safety reasons.**

Students who do not follow the safety guidelines provided by the course instructor will not be permitted to work in the lab. A first infraction will receive a warning. A second will result in the student being asked to leave the laboratory, and will be marked as absent for that day.

**Academic Honesty**

Students are expected to follow SUNY Oswego’s academic honesty guidelines as outlined in your student handbook. Students accept responsibility for academic honesty for every assignment turned in. Examples of academic dishonesty include, but are not limited to:

- Representing work completed by others as your own
- Modification of class materials for obtaining a higher grade
- Misrepresentation of materials obtained from published sources as your own

Students are required to submit exams, laboratory and written assignments that are to be completed individually. Students are encouraged to assist each other and interact in class. However, each student is to complete his or her own work independently. No portion of any assignment may be copied by any means in whole, or in part, from another student and represented as your own. Violating the academic honesty code will result in a failing grade of zero for the assignment or exam for the first offence. For a second offense, you will receive a failing grade for the course and you will be reported to the Office of Academic Affairs.

**Attendance**

Students are expected to be active participants at each class meeting. Attendance is mandatory and will be taken each class meeting. Three days late will be calculated as one absence. If a student is more than ½ hour late for class, or leaves more than ½ hour early, that will be considered a full day absence. After a student has exceeded three absences, students will be dropped from the class and receive a grade of “E”. Lab assignments or other work that is due on a missed day will not be accepted late. Makeup exams will not be permitted.

Use your lab time wisely. If you finish your planned activities early, work on additional activities instead of leaving early. The math is simple. If you leave ½ hour early on four separate days, you will lose the equivalent of one class time.

**Respectful and Professional Environment**

Students are expected to help maintain a respectful and professional environment. Inappropriate language, profanity, attire, or comments to other students in class will not be tolerated. Students exhibiting such behavior, as identified in the Code of Student’s Rights, Responsibilities, and Conduct, will be asked to leave class.

**Disabilities Policy**

Qualified students enrolled in this course are eligible for “reasonable accommodations” in compliance with the Americans with Disabilities Act (ADA). If you have a disabling condition that may interfere with your ability to successfully complete this course, please contact the Disability Services Office (315-312-3358, www.oswego.edu/dis_svc/). Please notify and provide documentation to the instructor during the **first week of classes** to make necessary arrangements.
Using Personal Electronic Devices in Class

Using electronic devices including cellular phones and music players is prohibited in the classroom and laboratory during class meeting times. Please turn off your cellular phones before the start of class and keep them off for the duration of class. Noise from these devices interrupts class and is a distraction for other students. If the class is interrupted by a student, they will receive one warning. For subsequent offences, the student will be asked to leave class, and will be marked absent for that class meeting.

Math Assistance

This class uses mathematics extensively. Basic algebra will be used to solve circuit problems. You will be expected to commit formulas to memory and apply them in classroom and laboratory activities. Use of calculators will be permitted. Logic and number systems will be introduced as part of the course. If you need assistance with the mathematics involved with the course, you can get additional help through the Office Learning Assistance.

Ways to Get Extra Help In Class

- If you need extra help on an assignment please see me as soon as possible.
- Office hours are available for extra help.
- If the office hours do not fit your schedule, please make an appointment.
- Email me. Call me. Stop by the office or lab.
- The lab will be open for work during the office hour times.
- Be an active part of learning – take the initiative!