PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

ACTIVE DEVICES I W/ LAB
EET 1210

Class Hours: 3.0 **Credit Hours: 4.0**

Laboratory Hours: 3.0 **Date Revised: Fall 2001**

NOTE: This course is not intended for transfer credit.

Catalog Course Description:

An introductory course in solid-state devices and the basic circuits in which they are used. Topics include semiconductor physics, diode circuits, bipolar transistor circuit analysis and FET circuit analysis, and operational amplifiers.

Entry Level Standards:

The student must have knowledge of basic DC circuits to include series and parallel circuits and network theorems such as Thevenin's and Norton's theorems. A complete understanding of Kirchhoff's Laws and power is also required.

Prerequisites:

EET 1010

Textbook(s) and Other Reference Materials Basic to the Course:

Fundamentals of Linear Electronics Integrated and Discrete, 2nd Edition, James F. Cox, Delmar Publishers, New York, NY ISBN 0-7668-3018-7
Parts Kit: Approximate Cost $15.00.

I. Week/Unit/Topic Basis:

The following is intended as a guide to the instructor. The material covered in the course may be changed by the instructor depending upon the progress, etc., of the class.

Week	Topic
1	Semiconductors materials; diodes, ideal and practical; applications.
2	Semiconductors materials; diodes, ideal and practical; applications.
3	Junction transistors, BJTs in circuits.
4	Junction transistors, BJTs in circuits.
5	More transistor amplifier circuits.
6	More transistor amplifier circuits.

7 Field-effect transistor amplifiers.

8 Field-effect transistor amplifiers.

9 Transistor switching circuits.

10 Chapter 6. Introduction to operational amplifiers.

11 Chapter 6. Introduction to operational amplifiers.

12 Chapter 7. Op-amp circuits.

13 Chapter 7. Op-amp circuits.

14 Chapter 8. Additional op-amp topics.

15 Chapter 8. Additional op-amp topics.

16 Review and final exam.

II. Course Objectives*:

A. Understand the operation and applications of the PN junction diode. I, II

B. Understand the operation of and how to properly bias/connect transistors and operational amplifiers. I, II

C. Calculate the DC and AC voltages present in transistor circuits and op amp circuits. I, II

D. Perform mid-band analysis of single and multistage small-signal bipolar and field effect transistor amplifiers and op amp circuits. I, II

E. Connect any of the circuits studied and make basic AC and DC measurements to verify circuit performance and reinforce the theory. I, II

F. Understand and perform frequency response of amplifiers. I, II

G. Understand the operation of thyristors and other special devices studied in the course. I, II

H. Demonstrate, as an individual and as a team member, library/information skills, time management skills, problem-solving skills, material management skills, and communication skills. I, II, III, IV, IX, X

*Roman numerals after course objectives reference goals of the EET program.

III. Instructional Processes*:

Students will:

1. Participate in classroom discussions which challenge their abilities to think creatively and visualize complex spatial and mathematical relationships to solve problems. *Problem Solving and Decision Making Outcome*

2. Work in teams to conduct laboratory experiments and also to solve special problem assignments. These activities are designed to foster interpersonal skills in teamwork and develop and enhance leadership skills, students' abilities to express ideas, and students' abilities to reach consensus solutions for the team through negotiation. *Active Learning*

Strategy, Problem Solving and Decision Making Outcome, Personal Development Outcome

3. Use electronic test equipment to test electrical circuits constructed from schematics in the laboratory and acquire data. Use computers with applications software to simulate, analyze, and predict the behavior of electrical circuits. Compare expected responses to experimental responses of electrical circuits. Use the Internet for special assignments such as locating data sheets on electronic components. Use computers with word processing software to prepare reports. *Technological Literacy Outcome, Information Literacy Outcome, Numerical Literacy Outcome*

4. Prepare reports on laboratory experiments which include methodology, mathematical analyses of electrical circuit models, a comprehensive comparison of calculated results with experimental results, and conclusions. *Communication Outcome, Numerical Literacy Outcome, Active Learning Strategy*

5. Discuss the importance of personal qualities such as personal responsibility, time management principles, self?esteem, sociability, self?management, integrity and honesty in school and in the workplace, and dynamics of change in the workplace. *Personal Development Outcome, Cultural Diversity and social Adaptation Outcome, Transitional Strategy*

*Strategies and outcomes listed after instructional processes reference Pellissippi State' s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Identify the anode and cathode of a diode. A

2. Obtain the diode characteristics from a curve tracer. A, E

3. Determine the forward and reverse breakdown voltage for any diode. A, E

4. Construct a bridge rectifier circuit with filter capacitor and measure ripple. A, E

5. Identify a voltage multiplier. A

6. Identify clamper circuit. A

7. Construct a zener regulator circuit. A, E

8. Explain the characteristics of a LED. G

9. Explain the operation of a photo diode. G

10. Explain the operation of an opto coupler. G

11. Properly take measurements using the Oscilloscope. E

12. Obtain transistor characteristics from a curve tracer. B, E

13. Explain the operation of the transistor as a switch. B

14. Connect circuits which will properly bias the transistor. B, E

15. Calculate and measure the DC and AC voltages present in bipolar and field-effect transistor circuits. B, C, E, H

16. Perform midband analysis of single and multistage bipolar and field-effect transistor small-signal amplifiers. D, H

17. Construct amplifiers using various configurations of bipolar transistors and field-effect transistors and measure voltages present. B, C, E

18. Explain Miller's Theorem and the use of decibels. F

19. Calculate the low-frequency response of an amplifier. F, H

20. Calculate the high-frequency response of an amplifier. F, H

21. Combine calculated low-, mid-band, and high-frequency responses to produce a complete frequency response of an amplifier. D, F, H

22. Perform frequency response measurement techniques in the laboratory on amplifiers. E, F

23. Understand the basic operation of the operational amplifier and perform midband analysis of op amp circuits. B, C, D, H

24. Explain the concept of feedback and how it can be used with op amps to produce inverting and noninverting amplifiers. B

25. Describe the use of op amps in instrumentation circuits. B

26. Note a number of common op amp applications, such as AC signal amplifiers, op amp integrators, etc. B

27. Acquire technical information from various media in the Educational Resource Center or elsewhere. H

28. Function as an effective team member in the lab or in classroom team assignments. H

29. Prepare a technical report. H

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 80% of grade

The evaluation in the classroom grade will be determined by a combination of tests, homework, and a final exam. Pop quizzes may also be used at the discretion of the instructor. The percentage that each of these factors count and the frequency of quizzes, tests and homework is left to the discretion of the instructor, but the following is offered as a guide:

Tests:	At least 4 tests	75%
Homework:	Approximately once per week	5%
Final Exam:		20%

B. Laboratory Expectations: 20% of grade

The laboratory grade will be determined by a combination of performance (including teamwork) within the lab and the degree of comprehension demonstrated in the lab report. There will be at least twelve labs during the semester to go along with the classroom material. The following is offered as a guide for the instructor:

Performance in labs (subjective)	20%
Lab Reports (neatness and content)	60%
Computer Program (or application)	10%
Laboratory Test	10%

Laboratory topics may vary at the discretion of the instructor, but will be related in a timely manner to the course work. The following list of topics is suggested:
A. Diode characteristics, rectifier circuits, capacitive filter
B. Diode limiter, clamper, voltage multiplication circuits, zener diode and voltage regulation
C. Bipolar transistor biasing
D. The common-emitter amplifier
E. The common-collector (emitter-follower) amplifier
F. The combination common-emitter and common-collector amplifier
G. The common base amplifier
H. FET biasing
I. The common source amplifier
J. Amplifier frequency response
K. Op amp application
L. Thyristor/special devices application

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

93 - 100	A
88 - 92	B+
83 - 87	B
78 - 82	C+
70 - 77	C
60 - 69	D
Below 60	F

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.
Unexcused absences and class or lab work not made up in a timely manner may very well result in a reduced grade for the course or in failure of the course. It is the student's responsibility to be present when the instructor informs the class of attendance and work

requirements, or otherwise the student must contact the instructor for this information. Attendance is required to all lab sessions unless excused by the instructor. Students missing more than four unexcused sessions will receive an "F" and no credit will be received. Students tardy past half an hour will be considered absent.

B. Other Policies:

The student is encouraged to read the regulations for student conduct in the PSTCC Catalog and Handbook.