Syllabus for EE 321/PHY 321—Electronics I Laboratory 1 Credit Hour Fall 2006

I. COURSE DESCRIPTION

This is a companion lab to EE 321 Lecture. It covers measurements of the characteristics of semiconductor devices and the analysis and design of single-stage BJT and FET amplifiers. Corequisite: EE 321Lecture. Lab fee: \$35.

II. COURSE GOALS

The University recognizes several general outcomes that arise from pursuing an education at ORU.

Of these, the following three outcomes are expected as a result of taking this course:

- A. Problem Solving and Analysis: This course will enable students to understand basic electronic circuits using diodes and transistors.
- B. Communication: Students will learn to express their ideas coherently and effectively in written form, in examination and in research papers.
- C. Global Perspectives and Citizenship: Students will recognize world-wide concerns and how they apply to the individual. They will discover the types of human behavior which create stress on the physical environment.

III. STUDENT LEARNING OUTCOMES FOR THIS COURSE

The students who successfully complete this course will be able to do the following:

- A. Use a digital computer to simulate electronic circuits.
- B. Use diodes and zener diodes in designing rectifier, power supply, and voltage regulator circuits.
- C. Demonstrate and use *npn* and *pnp* BJTs as well as *n* and *p*-channel JFETs in various circuits.
- D. Experimentally verify transistor operation using dc and ac models.
- E. Design a stable operating-point amplifiers using a given transistor.
- F. Design small-signal models for BJTs and JFETs.

IV. TEXTBOOKS AND OTHER LEARNING RESURCES

Required Materials Textbook Robert Boylestad, Louis Nashelsky and Franz Monssen. <u>Electronic Devices and Circuit Theory</u> (laboratory Manual), Eighth Edition, Upper Saddle River, NJ: Prentice-Hall, 2002. Latest Revision: F-2006

V. POLICIES AND PROCEDURES

- A. University Policies and Procedures
 - 1. Attendance at each class or laboratory is mandatory at Oral Roberts University. Excessive absences can reduce a student's grade or deny credit for the course.
 - 2. Students taking a late exam because of an unauthorized absence are charged a late exam fee.
 - 3. Students and faculty at Oral Roberts University must adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, video, multimedia, or computer software. By submitting an assignment in any form, the student gives permission for the assignment to be checked for plagiarism, either by submitting the work for electronic verification or by other means.
 - 4. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.
 - 5. Students are to be in compliance with University, school, and departmental policies regarding ePortfolio requirements. Students should consult the ePortfolio handbooks for requirements regarding general education and the students' majors.
 - a. The penalty for not submitting electronically or for incorrectly submitting an ePortfolio artifact is a zero for that assignment.
 - b. By submitting an assignment, the student gives permission for the assignment to be assessed electronically.
- B. Course Policies and Procedures
 - 1. Assessment Criterion:

| Lab assignments | 70% with each experiment being weighted equally |
|-----------------|---|
| Lab test | 30% |
| Total | 100% |

- 2. There are a total of 11 laboratory experiments and each of them will be weighted equally.
- 3. Maximum two students are allowed to form one group as partners to do each experiment together. The students must do their own hands-on experiment. The two partners are strongly encouraged to swap their roles from one experiment to another.
- 4. The experiment reports are due at the beginning of the laboratory session in the following week of each experiment. Late submission will result in lower grade.
- 5. Attendance at each laboratory is mandatory and the students are responsible for the completion of all the experiments. **Experiment reports without performing hands-on experiment are not acceptable**.
- 6. Each student is responsible for the University equipments that he/she uses during the laboratory period and will be assessed an appropriate fee for any items that are lost, damaged or broken
- Consulting and discussions are permissible and encouraged. Copying experiment results from solution manual and other classmates is considered dishonest.
 Dishonesty in an exam, if detected, will lead immediately to a failing grade for the course and will be reported to the Dean of Arts and Sciences.
- 8. ePortfolio Requirement
 - None
- 9. One of the experiment reports is required to be submitted as ePortfolio artifacts.

Following the department policy, the final grade will be reduced by 5% if it is not submitted by the end of the semester.

VI. COURSE CALENDAR

| Week 2 | | Introduction |
|---------|---------------------------|---------------------------------------|
| Week 3 | Experiment 2 | Diode Characteristics |
| Week 4 | Experiment 4 | Half-wave and Full-wave Rectification |
| Week 5 | Experiment 8 | BJT Characteristics |
| Week 6 | Experiment 9(1,3)/10(2,3) | Bias of BJT |
| Week 7 | Experiment 11 | Design of BJT Bias Circuits |
| Week 8 | Experiment12 | JFET Characteristics |
| Week 9 | Experiment13 | JFET Bias Circuits |
| Week 10 | Fall Break | |
| Week 11 | Experiment 14 | Design of JFET Bias Circuits |
| Week 12 | Experiment 17 | CE Transistor Amplifier |
| Week 13 | Experiment 18 | CB and CC Transistor Amplifier |
| Week 14 | Experiment 19 | Design of CE Amplifier |
| Week 15 | Lab test | |

Course Inventory for ORU's Student Learning Outcomes

EE 321/PHY 321—Electronics I Laboratory Fall 2006

This course contributes to the ORU student learning outcomes as indicated below: Significant Contribution – Addresses the outcome directly and includes targeted assessment. Moderate Contribution – Addresses the outcome directly or indirectly and includes some assessment. Minimal Contribution – Addresses the outcome indirectly and includes little or no assessment. No Contribution – Does not address the outcome.

The Student Learning Glossary at <u>http://ir.oru.edu/doc/glossary.pdf</u> defines each outcome and each of the proficiencies/capacities.

| OUTCOMES & Proficiencies/Capacities | Significant | Moderate | Minimal | No |
|--|--------------|--------------|--------------|--------------|
| | Contribution | Contribution | Contribution | Contribution |
| | | | | - |

| 1 | Outcome #1 – Spiritually Alive | | |
|------------|--------------------------------|--|--------------|
| | Proficiencies/Capacities | | |
| 1A | Biblical knowledge | | \checkmark |
| 1 B | Sensitivity to the Holy Spirit | | \checkmark |
| 1C | Evangelistic capability | | \checkmark |
| 1D | Ethical behavior | | \checkmark |

| 2 | Outcome #2 – Intellectually Alert | | | |
|----|-----------------------------------|--|--------------|--|
| | Proficiencies/Capacities | | | |
| 2A | Critical thinking | | | |
| 2B | Information literacy | | \checkmark | |
| 2C | Global & historical perspectives | | \checkmark | |
| 2D | Aesthetic appreciation | | \checkmark | |
| 2E | Intellectual creativity | | | |

| 3 | Outcome #3 – Physically Disciplined | | |
|----|-------------------------------------|--|--------------|
| | Proficiencies/Capacities | | |
| 3A | Healthy lifestyle | | |
| 3B | Physically disciplined lifestyle | | \checkmark |
| | | | |

| 4 | Outcome #4 – Socially Adept | | | |
|----|---|--|--------------|--------------|
| | Proficiencies/Capacities | | | |
| 4A | Communication skills | | \checkmark | |
| 4B | Interpersonal skills | | | \checkmark |
| 4C | Appreciation of cultural & linguistic differences | | | \checkmark |
| 4D | Responsible citizenship | | | \checkmark |
| 4E | Leadership capacity | | | |

(Revised 4/7/06)