EE BD 324 – Microelectronics I  
Course Syllabus  
Penn State Erie, The Behrend College  
Fall Semester 2006

Course Information
Credits: 4 (4:3:2)
Prerequisites: EE 210 (D or better is required, however, C or better is recommended).
Lecture: MWF, 12:20PM -1:10PM, REDC 101
Lab Section 1: R 8:30AM - 10:20AM, REDC 148
Lab Section 2: R 10:35AM – 12:25PM, REDC 148

Instructor
Dr. Xuping Xu
Office: REDC 166
Office Phone: 898-7169 (voice mail)
E-mail: Xuping-Xu@psu.edu
Office Hours: MF: 1:30PM-3:00PM, W: 9:30AM-11:00AM, or by appointment

Course Information on the Web
http://ecse.bd.psu.edu/eebd324 or go there through my homepage
http://ecse.bd.psu.edu/~xxx12 Course information will be made available at this site.

Required Materials
- Engineering paper.
- A proto-board for laboratory work.

References (24 hr reserve in the library)

Course Objectives: To introduce basic nonlinear devices: diodes, bipolar junction transistors, and field effect transistors. We will discuss their operation, how to analyze circuits containing them, and basic circuit applications. A solid understanding of these devices is required for understanding IC design.

Topic
Introduction to electronics
Semiconductor fundamentals and pn junction diodes
Diode circuits
Rectifiers, voltage regulators, and power supply circuits
Field effect transistors & DC analysis
Bipolar junction transistors & DC analysis
CMOS digital logic circuits

Textbook Chapters
1
3
3
3
4
5
4 & 10
**Grading Policy**

- 3 Exams: 40% (Exam #1: 13%, Exam #2: 13%, Exam #3: 14%)
- Final Exam: 20%
- Quizzes & Assignments: 15%
- Labs: 25%

**Grade Assignments**

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<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>93-100</td>
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<tr>
<td>A-</td>
<td>90-92</td>
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<td>B+</td>
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<td>D</td>
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These guidelines may be revised downward in favor of the students during the course of the semester.

**Important Dates**

- **Exam #1**: Monday – 10/9, in class
- **Exam #2**: Monday – 11/6, in class
- **Exam #3**: Wednesday – 12/6, in class
- **Final Exam**: To be announced, To be announced

**Assignments**: Problems will be assigned and collected. One or several problems will be selected and graded, or a quiz based on the assignment will be given. Homework assignments are due at the start of the class period. Solutions to the problems will be posted **after** they are graded. All assignments that are turned in should be neat and legible. In addition, assignments **must** be turned in on engineering paper (available in bookstore) and stapled. Failure to do so will result in a grade of zero on the assignment.

**Examinations**: There will be three in-class examinations and a comprehensive final exam. Makeups for missed exams and quizzes will be allowed in the event of an illness or emergency, but the instructor **must** be notified **before** the exam or quiz. **There will be no makeups for unexcused absences.**

**Class Attendance**: Students are expected to be regular and punctual in class attendance. You are responsible for all material covered in class. **Students must be present (and arrive on-time) during performance of the labs. Failure to do so will result in a point deduction on the laboratory in question.**

**Academic Integrity**: Penn State Erie puts a very high value on academic integrity, and violations are not tolerated. Academic integrity is one of Penn State’s four principles to which all students must abide. Any violation of academic integrity will receive academic and possibly disciplinary sanctions, including the possible awarding of an XF grade which is recorded on the transcript and states failure of the course was due to academic dishonesty. All acts of academic dishonesty are recorded so repeat offenders can be sanctioned accordingly.

I encourage students to help one another, but **plagiarizing will not be tolerated in this course**. You should be able to explain to me every single detail of your solution to the problem or the lab. Both parties involved in the plagiarizing case will receive zero points. Provable cases of cheating will be prosecuted to the fullest extent allowable by the University and the Commonwealth of Pennsylvania. More information on academic integrity can be found at: `http://www.pserie.psu.edu/faculty/academics/integrity.htm`

**Late Policy**: Assignments (including Labs) turned in late (after the **start** of class) will be penalized 25 percentage points. Assignments handed in more than 1 day late will **NOT** be accepted.
**Educational Objectives:** By the end of this course you should

1. Understand the fundamentals of semiconductor devices.
2. Understand the ideal and non-ideal i-v characteristics of diodes.
3. Understand how to analyze DC circuits containing ideal diodes.
4. Understand how to carry out AC small-signal analysis for circuits containing diodes.
5. Understand how to determine the transfer characteristic of circuits containing diodes.
6. Understand how to design (including tradeoffs) voltage regulators and power supplies utilizing diodes.
7. Understand the modes of operation of a BJT.
8. Understand how to analyze DC circuits containing BJTs.
9. Understand how to analyze BJT circuits in saturation.
10. Understand the modes of operation of enhancement mode MOSFETs.
11. Understand how to analyze and design MOSFET circuits at DC.
12. Understand the voltage transfer characteristics of a matched CMOS logic inverter.
13. Know how to utilize PSpice to analyze and design microelectronic circuits.

**Learning Resources:** The Learning Resource Center provides the following tutoring services relevant to the course:

- Writing tutoring is available in the Learning Resource Center, 203 Lilley Library.
- Math tutoring is available in the Roche Annex (2nd floor Roche Hall).
- Engineering tutoring is available in the REDC, Room 240.
- Tutoring for other subjects and study skills is offered by appointment. Stop in at the Learning Resource Center.
- For more information go to: [http://pennstatebehrend.psu.edu/academic/lrc/tutor.htm](http://pennstatebehrend.psu.edu/academic/lrc/tutor.htm)