# ECE 255 ELECTRONIC CIRCUIT ANALYSIS AND DESIGN Spring 2018

**Section 1: Chew TR: 7:30AM - 8:45AM ECE 170**

**Section 2: Gupta MWF: 3:30PM – 4:20PM PHYS 114**

TEXT: Microelectronic Circuits, 7th Edition, Adel S. Sedra and Kenneth C. Smith, 2014

## INSTRUCTORS: Weng Cho CHEW, WANG 3053, Phone 4-5402, Email: [wcchew@purdue.edu](mailto:wcchew@purdue.edu)

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OFFICE HOURS: WCC: TR: 9:00AM – 10:00AM, at WANG 3053 or by appointment

SKG: WF: 2:20 PM – 3:20 PM at WANG 2051 or by appointment

TEACHING ASSISTANTS: Garett McMindes Email: [gmcminde@purdue.edu](mailto:gmcminde@purdue.edu)

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## TA OFFICE HOURS: MWF: 9 am-11 am, 12-2 pm, Tue: 10 am-1pm, Thu: 1 pm-4 pm,

## MSEE 180

COURSE WEBSITE: Purdue Black Board Learn. Login Required.

LEARNING OBJECTIVES:

*A student who successfully fulfills the course requirements will have demonstrated:*

1. The ability to identify and correctly utilize the external lead structure and basic electrical characteristics of common semiconductor devices (pn junctions, MOSFETs, and BJTs).
2. The ability to analyze and design d.c. bias circuits.
3. The ability to utilize d.c. and a.c. models of semiconductor devices in both analysis and design.
4. The ability to analyze and design single and multistage amplifiers at low, mid and high frequencies.
5. The ability to use a CAD tool (e.g., SPICE) in circuit analysis and design.

GRADING:

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| --- | --- | --- | --- | --- | --- |
| Homework | 10% |  |  |  |  |
| SPICE | 10% |  |  |  |  |
| In Class Participation | 5% |  |  |  |  |
| Exam 1 | 15% | Mon | Feb. 12 | 8:00pm-9:00pm | Phys112/Phys114 |
| Exam 2  Exam 3 | 15%  15% | Tue  Mon | Mar. 20  Apr. 16 | 6:30pm-7:30pm  6:30pm-7:30pm | Phys112/Phys114  FRNYG140/Phys114 |
| Final | 30% | Fri | May 4 | 7:00pm-9:00pm | ELLT116 |

All students need to meet the listed learning objectives and outcomes in order to pass the course. Course grading will be A, B, C, D, F, I. All grades will be posted on Black Board Learn as soon as they are available.

EXAMS:

All exams are closed book and close notes. The only calculator allowed in the exam is the TI-30X IIS (available at the University Book Store or Follett)

HOMEWORK:

Homework assignments will be distributed weekly and due the following week unless specified otherwise by the instructor. Homework should be dropped in the assigned box in MSEE 180 by 5:00pm on the due day. You may work together on homework, as it may help understanding and learning the material effectively. Please list the names of the other students from your discussion group and be sure to hand in your own work. Solutions to all homework will be posted on Blackboard after the due day. The use of Chegg for doing your homework will be forbidden.

SPICE PROJECTS:

You CANNOT PASS the course unless you earn at least 50% of the SPICE project credits.

IN CLASS PARTICIPATION AND CLASS ATTENDANCE:

You are encouraged to participate in class by asking questions, answering questions, and attend the class regularly.

*i>clicker* will be used throughout the semester for in class quizzes. A “clicker” is an individual handheld device that allows each student to respond to questions that the instructor asks during class. A receiver at the front of the room collects everyone’s clicker responses, which the instructor can then instantly display as graphs to guide the day’s lecture. Your clicker responses are also saved by the receiver to ensure that you get credit for responses you make in class. Your clicker responses will be recorded as a component of the class participation grade. **Clickers will be used in the second week of the semester so make sure you purchase and register your clicker before or within the first week of the semester.** Since you are expected to participate in every class, **bring the clicker with you to every class!** If you forget your clicker on a given day, you will not be able to get points if clickers are used that day, just as if you forgot to finish answering all the questions in a test. There are no make-ups for clicker use. However, you will be allowed to **drop 3 of your lowest clicker scores during the course**, so if you miss a class or forget to bring the clicker for three times, it won’t count against you. You cannot participate at the same level of intensity without a clicker. You will earn 1 point for participation and an extra point for giving the correct answer for every quiz question.

Finally, since your clicker is registered to you individually, you may not loan it to someone else or let someone else use it to pretend they are you: the instructor will treat that the same as if you were caught cheating on an assignment or test!

GROUP CONTACT:

A mass email distribution list will be created through Blackboard. Please make sure you check your registered email address for course announcements and other important information.

ACADEMIC DISHONESTY POLICIES:

Every member of the Purdue community is expected to practice honorable and ethical behavior both inside and outside the classroom. Any actions that might unfairly improve a student’s score on homework, quizzes, or examinations will be considered cheating and will not be tolerated.

Examples of cheating include (but are not limited to):

* Sharing results or other information during an examination.
* Bringing forbidden material or devices to an examination.
* Working on an exam before or after the official time allowed.
* Requesting a re-grade of answers or work that has been altered.
* Submitting homework that is not your own work or engaging in forbidden homework collaborations.
* Let others use your clicker (if clicker is used) and pretend to be you in class

At the instructor’s discretion, cheating on an assignment or examination will result in a reduced score, a zero score, or a failing grade for the course. All occurrences of academic dishonesty will be reported to the Assistant Dean of Students and copied to the ECE Associate Head of Education. If there is any question as to whether a given action might be considered as cheating, please see the instructor for the teaching assistant before you engage in any such action.

INCOMPLETE, HOMEWORK, EXAM AND EMERGENCY POLICIES:

1. Incomplete grade is only for students who do most of the required work and at the end of the semester due to a **well-documented emergency** cannot finish the course.
2. **No make-up exams** will be given.
3. **Only** in **well-documented emergency situations,** we will allow a student to take the exam at a different time, no other excuses are accepted. Hunting, fishing, family reunions, fraternity events are not considered emergencies.
4. You cannot do extra work after the semester is over to change your grade. **All grades are FINAL once submitted**.
5. If you have any issue or difficulty with the course **you need to contact us during the semester and seek help in advance.**
6. In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Here are ways to get information about changes in this course.

* Course webpage on Purdue Blackboard
* Instructor’s email
* Instructor’s phone

### Course Outline

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| --- | --- | --- | --- |
| Week | Date | Topic | Chapter |
| 1 | 01/08 – 01/12 | Introduction to semiconductors; Diodes | Ch. 3.1-3.4 |
| 2 | 01/15 – 01/19 | Diodes, diode models and applications | Ch. 3.4-3.5  Ch. 4.1-4.3 |
| 3 | 01/22 – 01/26 | Diodes and applications; BJT  SPICE Tutorial | Ch. 4.4-4.6  Ch. 6.1 |
| 4 | 01/29 – 02/02 | BJT and BJT circuits | Ch. 6.2 -6.3 |
| 5 | 02/05 – 02/09 | MOSFET and MOSFET circuits | Ch. 5.1-5.2 |
| 6 | 02/12 – 02/16 | **EXAM 1;** MOSFET circuits | Ch. 5.3 |
| 7 | 02/19 – 02/23 | Small Signal Model for BJT | Ch. 7.2-7.3 |
| 8 | 02/26 – 03/02 | Small Signal Model for MOSFET | Ch. 7.2-7.3 |
| 9 | 03/05 – 03/09 | BJT and MOSFET amplifiers | Ch. 7.2-7.3 |
|  | 03/12 -- 03/16 | **SPRING BREAK** |  |
| 10 | 03/19 – 03/23 | **EXAM 2**; Discrete circuit amplifiers | Ch. 7.5 |
| 11 | 03/26 – 03/30 | Differential amplifiers | Ch. 9.1-9.3, Supp. Notes |
| 12 | 04/02 – 04/06 | Current Mirrors & Operational amplifiers | Ch. 8.2, Ch. 9.6 |
| 13 | 04/09 – 04/13 | Frequency response and low frequency | Ch. 10.1-10.2 |
| 14 | 04/16 – 04/20 | **EXAM 3;** Frequency response | Ch. 10.3 |
| 15 | 04/23 – 04/27 | High frequency response; Miller effect | Ch. 10.3-10.4 |
| 16 | 04/30 – 05/04 | **EXAM WEEK** |  |