Spring 2022

EENG 331 – MICROELECTRONICS II

Department of Engineering & Design at Eastern Washington University

COURSE DESCRIPTION:

INSTRUCTOR:

OFFICE HOURS:

PREREQUISITES: REQUIRED TEXT:

This course introduces modeling, characterization and application of semiconductor devices and integrated circuits. It includes the development of models for circuit-level behavior of CMOS transistors and applies the models to the analysis and design of linear amplifiers and frequency analysis.

Dr. Saqer Alhloul

E-mail: [salhloul@ewu.edu](mailto:salhloul@ewu.edu) Office: CAT 332

Phone: (509) 359- 4282

Monday-Thursday: 10:00 AM – 10.50 AM

I encourage you to make appointments if these times conflict with your schedule.

MATH 210 and EENG 330 both with a minimum of 2.0 (C or better).

Fundamentals of Microelectronics, 2nd Edition, Behzad Razavi.

CANVAS: There will be a Canvas site for the course (www.canvas.ewu.edu). Please make sure that the email address you have in Canvas is the email address you actually use! Please check Canvas periodically, as all the lecture notes, assigned homework, labs, handouts etc. will be posted there. You will be responsible for being aware of all material and announcements I post.

Grading:

|  |  |  |
| --- | --- | --- |
|  | **Grade** | **Details** |
| **Assignments/Quizzes** | **10%** | **Assignments will be assigned through Canvas. The submission is also through Canvas in a PDF form. Assignments could also be assigned using an online quiz format which will be graded automatically** |
| **Labs** | **20%** | **5% Pre-Labs**  **5% Lab Completion.**  **10% Lab Reports (See the lab report guidelines)** |
| **Midterm** | **30%** | **Only one Mid-Term will be assigned (Week 5-6)** |
| **Final** | **40%** | **A comprehensive exam (This may be negotiated depending on the overall class performance) No Make-up under any circumstances. Curving won’t be applied.** |

* No credit is given for assignments and Labs past due.
* If you miss a class due to an undocumented reason then it is your responsibility to get the notes and what was covered in the class from your colleagues.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **4.0100** | B+ | 3.590 | B | 3.080 | C | 2.070 | D | 1.060 |
| **A** | **4.099** | B+ | 3.489 | B- | 2.979 | C- | 1.969 | D- | 0.959 |
| **A** | **4.098** | B+ | 3.488 | B- | 2.878 | C- | 1.868 | D- | 0.958 |
| **A** | **4.097** | B | 3.387 | B- | 2.777 | C- | 1.767 | D- | 0.857 |
| **A** | **4.096** | B | 3.386 | C+ | 2.676 | D+ | 1.666 | D- | 0.856 |
| **A** | **4.095** | B | 3.285 | C+ | 2.575 | D+ | 1.565 | D- | 0.755 |
| A- | 3.994 | B | 3.284 | C+ | 2.474 | D+ | 1.464 | F | 054-0 |
| A- | 3.893 | B | 3.183 | C+ | 2.373 | D+ | 1.363 |  |  |
| A- | 3.792 | B | 3.182 | C | 2.272 | D | 1.262 |  |  |
| B+ | 3.691 | B | 3.081 | C | 2.171 | D | 1.161 |  |  |

Labs:

There are two lab sections for EENG 331, one on Wednesday and another on Thursday. Most of Labs have a pre-lab where students are expected to have it done before the lab session starts. In addition to that, the Lab assessment is composed of a lab completion component and a lab report component. Students are expected to finish all lab tasks within the 1 hour and 50 minutes period to get the full grade. Students will be given 6 days to write the lab report where every two/three students are expected to work in a group. An F grade for the EENG 331 course will be assigned if a student misses two labs without a documented excuse.

Class Act of conduct:

1. Cell phone usage is **prohibited** during the class; please make sure you turn off your cell phone prior entering the class.

2. Eating food during the class is **not allowed**

3. Soft drinks are **okay**.

4. The lecture will **start** at **9:00 AM** (sharp), if you **fail** to show up on time you **will not be granted access to the class room**. Make sure you come ahead of time by at least 5 minutes.

5. Laptop usage during the lecture time is not allowed. Tablets used for taking notes are OKAY.

6. Talking to your colleagues during the lecture time is prohibited.

EXAMS Policy:

1. You are required to show up on time for both the Mid-Term and the Final. Failure to show up to scheduled exams will results in a zero credit for that particular test.
2. During the test, you are not allowed to wear a watch regardless of its type, headphones or any electronic device. Your cell phone should be off/on the silent mode.
3. Exams are usually given during the Lab period to allow you to take advantage of 2 full hours. Be prepared to stay longer in case you needed time to finish all questions. (This would be possible if both sections agree on a common lab time to use for exam purposes)
4. In the case of course grade dissatisfaction, you can email me about the reasons to have your grade adjusted. If need be I will revise all your grades for all tests. During the quarter I am more lenient in grading, if I revise your work you have to understand that I may deduct partial credit points that I feel you don’t deserve as the revision will work both ways (to your advantage or disadvantage) which may increase/decrease your grade.

Attendance Policy:

1. You have the choice on whether to attend the class or not. If you miss a class it is your responsibility to get the notes from your colleagues. You also will be responsible for understanding any concepts that I cover in the class that are not covered by the book.
2. Missing 2 labs will results in an F for the course. Missing the first lab will result in a zero credit for that particular lab. If you are working in a group, it is only the student that missed the lab that will get affected.
3. You have to show up no later than 1.05 PM to be granted access to the lab.

HOMEWORK: **Please follow these guidelines to get a perfect grade:**

* Home works can be solved individually or as a group.
* Use gridded or lined paper as your answer sheet. (Do not use blank white papers) (-5 pts)
* Staple all your answer sheets together at the left corner of the sheet. (-1/2 pts)
* Make sure you write your name at the top right corner of the answer sheet (please do not use any names different than your legal name). (-1/2 pts)
* Only use a pencil.
* Write the question statement you are attempting to solve. (-2 pts)
* your answer should be organized. The final answer should be placed in a box. (-1/2 pts/answer)
* Write the unit of the answer, i.e. Ohms for resistance, Volts for voltage ... etc). (-1 pts/answer)
* Use a ruler to draw circuits. (-2 pts/circuit)
* Scratches, scribbles, spots or any traces on your answer sheet will not be tolerated. (25% of the total grade will be deducted if this is slightly noticed. In the case of submitting an answer sheet full of scratches/ spots etc, a zero grade will be assigned for the submitted work)
* Home works are usually due one week later of the posting date.

FINAL EXAMINATION: NO MAKE UP FINAL under no circumstances. The final exam will be held on Tuesday 14th of June 2022 from 8.00 AM – 10.00 AM in the class room.

ACADEMIC INTEGRITY: Violations of academic integrity will not be tolerated. EWU expects highest standards of academic integrity of its students. Examples of academic dishonesty include misrepresenting other’s work as your own, failure to provide proper citations in written text, stealing or destroying material intended for the use of other students, using notes or non-permitted equipment during exams, copying someone else’s work, letting his or her work be copied. Students committing academic dishonesty will be reported to the appropriate university official and an XF grade for this course will be recorded on the student’s transcript. In cases where a student has an existing record of academic dishonesty, a more severe penalty may be sought (e.g. involving suspension or dismissal from the university).

TENTATIVE OUTLINE: Note: The topics may change at any time.

* CMOS structure
* CMOS amplifiers
* Cascode amplifiers
* Current Mirrors
* Amplifiers Frequency Analysis
* Differential Amplifiers (this is an overshoot)
* Feedback (This is an overshoot)

**Equal Opportunity Statement**

No person shall, on the basis of age, race, religion, color, gender, sexual orientation, gender identity, national origin or disability, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity of Eastern Washington University.

**Affirmative Action Statement**

Eastern Washington University adheres to affirmative action policies to promote diversity and equal opportunity for all faculty and students.

**American Disability Act**

Eastern Washington University is committed to providing support for students with disabilities. If you are a student with physical, learning, emotional, or psychological disabilities needing an accommodation, you are encouraged to stop by Disability Support Services (DSS), TAW 124 and speak with Kevin Hills, the Manager DSS or call 509-359-6871