

EE4981

Fundamentals of VLSI Circuits

Spring 2019

Syllabus

COURSE DESCRIPTION, GOALS, and OUTCOMES

Course Description

Fundamentals of VLSI Circuits - Fabrication and Design of Analog and Digital VLSI Circuits (3). This course traces the development of VLSI circuits from Silicon ingot through mixed signal circuit design. Coverage includes semiconductor process technology (diffusion, ion implantation, patterning, ...), device physical structures (R, C, diodes, bipolar/MOS transistors), detailed transistor level logic design and layout, analog bipolar and MOS opamp design, and mixed signal designs such as A/D converters.

Prerequisites & Notes

CE 1911, EE3112, PH 3600

Primary Goal:

Provide a solid foundation in VLSI design.

ABET Outcomes:

- a – Covered by most topics
- b – Evaluation and design of various layout structures
- c – Transistor level design of logic gates, opamps, and A/D convertors
- d – N/A
- e – Covered by most topics
- f – N/A
- g – Project reports
- h – N/A
- i – Ability to tackle new concepts outside traditional EE classes
- j – Covered by most topics
- k – Covered by most topics

COURSE MECHANICS

Class Details

Section 011:

Room - S-206
Days - Monday, Wednesday
Time - 9:00 – 9:50

Lab Details:

Section 011:

Room - S-3512
Days - Tuesday
Time - 12:00 – 1:50

Instructor:

Dr. Johnson
Office: S-336
Email: johnsontimoj@msoe.edu
preferred method of contact
(prepend all email subjects with EE4981 - subject...)
Website – <https://faculty-web.msoe.edu/johnsontimoj>
Office phone - (414) 277-2682
Office hours: See web page

Text Book – None

Class website:

<https://faculty-web.msoe.edu/johnsontimoj/EE4981/index-ee4981.html>

Notes, Handouts and readings will be available on the website.
Grades will be posted on Blackboard.

Class Schedule:

SUBJECT TO CHANGE – depending on overall class progress and any unforeseen natural phenomena.
Please check the website for the current schedule

COURSE POLICIES and PROCEDURES

Support Outside of Class:

If you are struggling it is ALWAYS better to ask for help early since concepts build upon each other. In addition, office hours will be more crowded prior to the test and you may not get the kind of time needed to clarify your understanding.

Student Accessibility Services (SAS)

For students with documented disabilities, chronic medication conditions and mental health concerns; MSOE provides services to make reasonable accommodations available. If you are a student who requires or anticipates the need for accommodations, please contact Student Accessibility Services Office at 414-277-7281, by email at moureau@msoe.edu, or in person at K250 to discuss appropriate accommodations and eligibility requirements.

Your success as a student is of utmost importance to me. If you have a disability or any other special circumstance that may have some impact on your work in this class, and for which you may require special accommodations, please contact me early in the semester so that accommodations can be made in a timely manner.

Professionalism and Academic Honesty:

A professional does not take credit for the work of someone else.

All students are expected to conform to the **Policy on Student Integrity** outlined in the MSOE Undergraduate Academic Catalog.

Working collaboratively on assignments is allowed and encouraged (sharing ideas and approaches). **The work you turn in however must be your own.** (code, problem solutions, calculations).

Attendance:

Lab and class attendance is REQUIRED, any unexcused lab absences will result in a 0 for the lab.

In Class Behavior:

You are young professionals and I expect you to act accordingly. Disruptive behavior of any kind will be referred to the appropriate administrative office.

No video or audio recording is allowed in class. Failure to follow this rule will be treated as academic dishonesty and dealt with accordingly.

LEARNING OUTCOME ASSESSMENT

Assessment Overview:

The goal of this course is to ensure students learn the concepts identified in the *Learning Outcomes and Objectives* section. In order to meet this goal, students must be assessed in order to determine if they have in fact learned these concepts. To that end there will be five assessment components in this course:

- Lab 60%
- Tests 40%
- Participation <1% only used on borderline cases

Lab / Lab Exam:

Lab work is essential to turning concepts and ideas into real world artifacts. It is intended to solidify the concepts in the students mind and enhance the overall learning process.

Tests:

Tests will serve two primary purposes in this class.

They will be used as feedback to the instructor on teaching/learning progress.

They will be used to assess student understanding of the material.

Makeup Tests:

If you have an excused absence from a scheduled test based on documented participation in a University-related activity (e.g., band trip), you must make arrangements **in advance** to take your test during an alternate time during the week the test is being administered.

If absence during a scheduled test period is excused (due to illness or family emergency, which must be verified *in writing*), you will be given the opportunity to make up the missed test upon your return.

Participation:

Participation in class is valuable to the student, the instructor, and others in the class.

Participation will not be officially graded. I reserve the right to use participation as the “borderline” determining factor as outlined in the *Grading* section.

Grading:

On each Test you will receive a “raw score”. This will reflect your un-weighted performance. Your “raw score” will be shifted with respect to the upper percentile of the class to obtain a “weighted score”. It is these weighted scores that will be used in your “overall score” calculation.

For example, if the top student has a raw score of 93%, everyone’s raw score will be multiplied by 1.075 (1.00/0.93) to obtain their corresponding weighted score.

For the final grade, equal-width cutoffs will be applied based on a cutoff width of 10 (i.e., the nominal cutoffs for A-B-C-D will be 90-80-70-60, respectively). Final scores in the lower 15% of each range and the upper 15% of the subsequent range will receive a mixed grade of AB, BC, or CD.

A “borderline” is officially defined as an overall score within 0.5% of a cutoff when the final grade calculation is performed. Before course grades are assigned, the instructor will carefully examine all such cases and determine if the next higher grade is warranted. **Primary factors will be participation or recognition of one bad test/lab.**