# ECE4452 Course Syllabus

**ECE4452**

**Integrated Circuit Fabrication (2-0-3-3)**

**CMPE Degree**

This course is Elective for the CMPE degree.

**EE Degree**

This course is Selected Elective for the EE degree. * (Selected Elective means this course is one of a few choices that are required for the degree.)

**Lab Hours**

3 supervised lab hours and 0 unsupervised lab hours

**Course Coordinator**

Frazier,Albert B

**Prerequisites**

(ECE 3030 [min C] or ECE 3040 [min C]) and ECE 2031 [min C]

**Corequisites**

None

**Catalog Description**

Introduction to microelectronic processing technologies and CMOS. Includes a laboratory for fabrication/testing of MOS transistors, basic CMOS circuits, integrated resistors and capacitors.

**Textbook(s)**

No Textbook Specified.

**Course Outcomes**

Upon successful completion of this course, students should be able to:

1. Fabricate CMOS circuitry using a basic CMOS manufacturing procedure.
2. Perform common fabrication processes used in microelectronics fabrication.
3. Test integrated circuits and interpret non-ideal behaviors.
4. Correlate non-ideal IC behavior back to the processes used to fabricate the device under test.
5. Model IC physical parameters such as junction depth, dopant concentration and modify fabrication process flow designs to improve device performance
6. Write technical reports related to the laboratory experiences, integrated circuit characterization, and a process design project.
7. Compile a Process Design Project including analyzing non-ideal performance of fabricated ICs, developing a process flow to improve performance.

**Student Outcomes**

In the parentheses for each Student Outcome:
"P" for primary indicates the outcome is a major focus of the entire course.
“M” for moderate indicates the outcome is the focus of at least one component of the course, but not majority of course material.

“LN” for “little to none” indicates that the course does not contribute significantly to this outcome.

1. ( P ) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. ( M ) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. ( M ) An ability to communicate effectively with a range of audiences
4. ( LN ) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. ( M ) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. ( P ) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. ( LN ) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

**Topical Outline**

Introduction, Safety, and Semiconductor Materials

Crystallography

Oxidation

Photolithography

Diffusion

Wet Etching Tech

Plasma Processing

Metallization

Ion Implantation

CVD Processes

MEMS Processes

Integration