ECE302 Microelectronics

Department: ECE Elective 4 credits

Web page: https://wolfware.ncsu.edu

Prerequisite: C- or better in ECE 211 — Electric Circuits


Course objectives:

By the end of this course, the student should be able to: (use demonstrative verbs)

1. Describe the essential characteristics of materials and semiconductors.

2. Explain the operation principles of diodes (p-n junctions), and transistors (MOSFET and BJT).

3. Recognize I-V characteristics of diodes (p-n junctions) and transistors (MOSFET and BJT).

4. Describe the basic steps of an integrated circuit fabrication.

5. Simulate circuits which contain active and passive elements using PSPICE.

6. Formulate basic digital inverter characteristics.

7. Analyze single stage amplifiers circuits.

8. Classify different types of amplifiers.


Course Description: Introduction to the physics of semiconductors, diode (pn-junctions, and transistors (MOSFET, BJT): Physics of operation, I-V characteristics, circuit models, PSPICE analysis; diode circuits; Single Stage Transistor Amplifiers: Common Emitter, Common Source, Common Base, Common Gate, Common Collector and Common Drain configurations, biasing, calculations of small signal voltage gain and current gain, input and output resistances; Logic Inverters, CMOS logic.