

# **SAMPLE SYLLABUS**

This syllabus is to be used as a guideline only. The information provided is a summary of topics to be covered in the class. Information contained in this document such as assignments, grading scales, due dates, office hours, required books and materials may be from a previous semester and are subject to change. Please refer to your instructor for the most recent version of the syllabus.

## ABET Course Syllabus EEE436

1. **Course: EEE 436 Fundamentals of Solid-State Devices**
2. **Credits and Contact Hours:** 3 Credit Hours (lecture), Topics: Engineering
3. **Course Coordinator:** Dr. T. Thornton, Professor
4. **Textbook:** R.F. Pierret, *Semiconductor Device Fundamentals*, 1<sup>st</sup> Edition 1995, Prentice Hall ISBN: 0201543931.  
**Supplemental materials:** B.G. Streetman, *Solid State Electronic Devices*, Fourth Edition, Prentice-Hall, 1995.
5. **Specific course information**
  - a. **Catalog description:** Semiconductor fundamentals, pn junctions, metal-semiconductor contacts, metal-oxide-semiconductor capacitors and field-effect transistors, bipolar junction. Transistors.
  - b. **Prerequisites or co-requisites:** EEE352.
  - c. **Required/elective/selected elective:** Elective
6. **Specific goals for the course**

Students will understand semiconductor physics and devices.

  - a. **Outcomes of instruction:**
    1. Students will demonstrate an understanding of semiconductor physics and the operation of the most common semiconductor devices (pn junctions, metal-semiconductor devices, metal oxide semiconductor devices, and bipolar junction transistors), and will be prepared for subsequent courses with this course as a prerequisite.
  - b. **Outcomes of Criterion 3 addressed by the course:**
    - (1) To understand the physics of semiconductor devices and the theory of their operation, students must use a variety of mathematical formulations and physics-based theory. Students must apply mathematics in the solution of the homework assignments. Students develop problem solving abilities and use modern computer programs in individual homework assignments.
    - (7) Students learn from the lectures and assigned reading material how semiconductor devices function and their place in today's electronic world.
7. **Brief list of topics to be covered**
  1. Crystal growth
  2. Miller indices
  3. Band diagrams
  4. Carrier statistics
  5. Carrier transport
  6. pn junctions
  7. Metal-semiconductor contacts
  8. Bipolar junction transistors
  9. MOS capacitors
  10. MOS field-effect transistors

### Computer Usage:

Most of the homework problems require the use of a computer for both calculation and plotting. The students can use their computer of choice. Most commonly, personal

computers are used with existing software such as Mathematica, MathCad, MATLAB, BASIC, Fortran, C, Kalaidagraph, Cricketgraph.

**Laboratory Experiments:** None.

**Course Contribution to Engineering Science and Design:**

Students have to solve a variety of problems both in homework assignments and in exams. Some of these require extensive computer calculations; others are conceptual problems.

Person preparing this description and date of preparation: K. Tsakalis, June, 2021.