# 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 EEE437

1. **Course: EEE 437 Optoelectronics**
2. **Credits and Contact Hours:** 3 Credit Hours (lecture), Topics: Engineering
3. **Course Coordinator:** Dr. Meng Tao, Professor
4. **Textbook:** J. Singh, *Semiconductor Optoelectronics: An Introduction to Material and Devices*, McGraw-Hill, 1996.
   **Supplemental materials:** Course website:
   http://www.eas.asu.edu/~roedel/eee437s00/index.html.
5. **Specific course information**
   a. **Catalog description:** Basic operating principles of various types of optoelectronic devices which play important roles in commercial and communication electronics; light-emitting diodes, injection lasers, and photodetectors.
   b. **Prerequisites or co-requisites:** EEE436.
   c. **Required/elective/selected elective:** Elective
6. **Specific goals for the course**
   - Students understand the analysis of the operation and performance of optoelectronic materials
   - Students understand design criteria for semiconductor optical sources (including light emitting diodes and laser diodes) for a variety of applications
   - Students understand design criteria for semiconductor optical detectors (including photodiodes and solar cells) for a variety of applications

   a. **Outcomes of instruction:**
      1. Students are conversant with the optical properties of semiconductors
      2. Students are conversant with optical processes in semiconductors
      3. The students are conversant with the application of optical properties and processes in semiconductor optical sources
      4. The students understand the operation of LEDs and lasers
      5. The students are familiar with the structures and performance of LEDs and lasers
      6. The students understand the application of LEDs and lasers
      7. The students are conversant with the application of optical properties and processes in semiconductor optical detectors
      8. The students understand the operation of photodetectors
      9. The students are familiar with the structures and performance of photodetectors
      10. The students understand the application of photodetectors

   b. **Outcomes of Criterion 3 addressed by the course:**
      **(1)** Students must apply math (differential equations, vector calculus, statistics), modern physics, optics, semiconductor physics in analyzing optoelectronic devices. Students are required to analyze and solve problems using modern physics concepts (quantum mechanics, optics, transport theory, semiconductor statistics) using ordinary and partial differential equations as well as vector calculus (e.g. in solving boundary value problems in EM). Problems related to optimization of power dissipation, output power, etc. are also considered in course.
      **(2)** Students learn appropriate models for describing the behavior of complex semiconductor optoelectronic devices, and employ them to solve problems related to

device/system behavior. Students learn about optical communications technology, receive some exposure to optical communication systems and perform minimal design.
**(7)** Optoelectronics is a rapidly evolving technology that is expected to be one of the major high-bandwidth communications areas over the next decade. Students are assigned and solve problems on each of the topics listed that require consideration of context and constraints. Course lectures focus on contemporary issues in communications technology, and its future.

7. **Brief list of topics to be covered**
   1. Optoelectronic material
   2. Optical properties of semiconductors
   3. Review of P/N junction theory
   4. Light emitting diodes
   5. Injection lasers
   6. Photodetectors
   7. Solar cells
   8. Integrated optics
   9. Recent advances in optoelectronic devices

**Computer Usage:** None.

**Laboratory Experiments:** None.

**Course Contribution to Engineering Science and Design:**
Students learn advanced topics in modern physics, semiconductor physics, and optics relevant to Engineering Science. The design content is relatively low apart from open-ended problems and term projects.

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