1. ECE 573: Semiconductor Optoelectronics Laboratory

2. 3 credits: 1-50 minute lecture session/week, 2 credits weekly lab time assigned

3. Kevin Lear

4. None

5. Course Information
    a. Experimental characterization techniques for semiconductor optoelectronic devices and design and testing of related electronic circuits
    b. Prerequisites: ECE 471B
    c. Selected Elective: Electrical Engineering; Computer Engineering; Lasers & Optical Engineering

6. Goals for the Course
    a. Course Learning Objectives
        i. Describe the light-current-voltage relationships of LEDs, laser diodes, and photodiodes and demonstrate how to measure associated parameters
        ii. Draw circuit schematic diagrams, layout simple printed circuit boards, construct, and test analog circuits interfacing optoelectronic devices
        iii. Discuss ideal and practical sources of noise in amplifier circuits
        iv. Analyze LabVIEW block diagrams used for controlling measurement equipment and to make minor modifications to the related code
        v. Model optoelectronic components using PSpice
        vi. Write laboratory reports that effectively communicate experimental purpose, design, execution, data collection, analysis, and conclusions and to summarize project information in presentations
    b. Student Outcomes
        1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
        2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline
        3. An ability to communicate effectively with a range of audiences
        6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

7. Topics Covered
    Lab report format / LabVIEW
    Semiconductor Parameter Analyzer / LED current-voltage characteristics
    Optical power and spectrum measurements / LED characterization
    Electrical probe station / Photodiode responsivity characterization
    Laser diode DC characteristics
    PSpice modeling of circuits with optoelectronic devices

Pulsed (AC) measurements using LEDs, laser diodes, and photodiodes
Circuits for amplifying photodiode signals
Noise and shielding / Circuit construction techniques
Printed circuit board design
Fiber optic transceiver modules
Printed circuit board assembly and testing
Fiber optic system test

Course last offered in Spring 2012