

COURSE: EECS 429. TITLE: Semiconductor Optoelectronic Devices. PREREQUISITES: EECS 320 or Graduate standing.		ELECTIVE.
TEXTBOOK: P. Bhattacharya, <i>Semiconductor Optoelectronic Devices</i> , Prentice-Hall, 2 nd ed.		
CATALOG DESCRIPTION: Materials for optoelectronics, optical processes in semiconductors, absorption and radiation, transition rates and carrier lifetime. Principles of LEDs, lasers, photodetectors, modulators and solar cells. Optoelectronic integrated circuits. Designs, demonstrations and projects related to optoelectronic device phenomena.		
COURSE OBJECTIVES: 1. To teach students the tools to analyze the operation of semiconductor optoelectronic devices; 2. To teach students heterojunctions and quantum wells and their application to optoelectronic devices; 3. To teach students design, analysis, & modeling of semiconductor lasers (dc & modulation properties); 4. To teach students design and small-signal circuit modelling of various types of photodetectors; 5. To provide hands-on laboratory experience with lasers, optical detectors, LEDs & optical modulators.		TOPICS COVERED: 1. Band gap semiconductors, quantum wells, heterostructures 2. LEDs; junction & novel lasers 3. Optoelectronic modulation, photo detectors, junction solar cells 4. Optoelectronic integrated circuits 5. Lab demos of device performance
COURSE OUTCOMES [Program Outcomes Addressed] 1. Ability to compute dc and high-frequency modulation characteristics of LEDs; [1,11,13] 2. Ability to design single-mode junction lasers at different wavelengths to meets specs; [3,5] 3. Ability to design junction & avalanche photodiodes to meet specs (dark current, gain, bandwidth)[3,5] 4. Ability to incorporate heterostructures and quantum wells to improve device performance.[1,11]		ASSESSMENT (Course outcomes) 1. Weekly problem sets [1,2,3,4] 2. 3 open-book exams [1,2,3,4] 3. Short projects based on lab demos [1,2,3,4]
PROGRAM OUTCOMES ADDRESSED: 1,3,5,11 PROFESSIONAL COMPONENT ADDRESSED: 13 PREPARED BY: Andrew E. Yagle on Nov. 25, 2004	CLASS/LABORATORY SCHEDULE: LECTURES: 3 per week @ 50 minutes. LABORATORY: 1 per week @ 1 hour	

COURSE DESCRIPTION: University of Michigan, College of Engineering, ELECTRICAL ENGINEERING PROGRAM