PURDUE
UNIVERSITY

SCHOOL OF ELECTRICAL
AND COMPUTER ENGINEERING
UNDERGRADUATE ADVISING OFFICE

To: The Engineering Faculty
From: School of Electrical and Computer Engineering
Re: ECE 30415

The School of Electrical and Computer Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ECE 30415 Fiber Optics and Lasers Laboratory
Semesters offered: Fall
Non-repeatable
Credit 1

Pre/Co-requisites:
ECE 30100
ECE 30411 or ECE 31100
MA 26200 or (MA 26500 and (MA 26600 or MA 36600))

Course Description
This laboratory course exercises in lasers, modulation of laser beams, fiber components and systems. It covers some simple optical measurements like Power and beam spot measurement of Gaussian beams. Students learn about lens-pinhole spatial filters and beam expanders. Fourier transform, convolution and correlation are covered. Characteristics of LEDs and ILDs are shown. Students become familiar with optical fibers related experiments like Fiber-optic microbend intensity sensors, Electrooptic modulation, Fiber optic Mach-Zehnder interferometer etc. Students also learn how to build laser systems based on the knowledge acquired from previous labs and with some simple set up. Finally there is a final project where students can design a practical optical instrument based on their knowledge from the lab.

Reason
This is a new courses in the ECE Optics path that complements ECE 30415 with hands-on experience.

History of Previous Offering
This is a new course.

Michael R. Melloch, Associate Department Head of ECE

ECE 30415 - Fiber Optics and Lasers Laboratory

Lab Hours: 3 Credits: 1
Professional Attributes
Upper Level Lab

Normally Offered: Each Fall

Course Prerequisites and Co-requisites:

This class is designed for advanced undergraduate students. Official co-requisites are ECE 301 (Signals & Systems) and ECE 311 (Electromagnetism). Ideally, you should be comfortable with these topics: differential equations, matrix algebra, electric circuits, semiconductor devices, electromagnetism (Maxwell's equations), and the propagation, reflection, and refraction of plane waves.

Prerequisites by topics: Uniform plane waves, reflection and refraction of plane waves, rudimentary differential equations and matrix algebra, basic concepts in electric circuits and in semiconductor devices, basic concepts of electromagnetism, Maxwell's equations.

Catalog Description:
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Supplementary Information:
Will be effective fall only semesters effective fall 2016.

Required Text(s): None.

Recommended Text(s): None.

Learning Outcomes:

A student who successfully fulfills the course requirements will have demonstrated:

i. an ability to properly handle basic optical components and equipment. [None]
ii. an ability to assemble and align necessary optical components to perform simple optical experiments. [None]
iii. an ability to design and test simple fiber communication systems. [None]

Lab Outline:

Week	Experiment
1	Power and beam spot measurement of laser beams.
2	Fabry-Perot Cavity and Optical Spectrum Analysis
3	Interference Effects
4	Characteristics of LEDs and semiconductor lasers.
5	Introduction to optical fibers.
6	Microbending loss in intensity sensors.
7	Acousto-optic modulation and deflection.
8	Electro-optic modulation.
9	Design project.
10	Fiber optic Mach-Zehnder interferometer.
11	Few-mode fibers.
12	Design project.
13-14	Holographic recording and reconstruction
15	Design project