ECE 5760 Syllabus, Fall 2006

No: ECE 5760

Title: 5760 Fiber Optics Engineering Laboratory.

Credits: 2 (lab)

Coordinator: Ivan Avrutsky,
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Instructor: Mohammed M Hossain
Ph. D Student
Department of Electrical and Computer Engineering

Office Hours:

Office: 

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Course Meeting Time: Wednesday 5:30pm to 9:30pm, 09/05/2006 – 12/20/2006

Course Meeting Location: Optics / Fiber Optics Lab, Room # 125, Department of Physics.

Goals: To develop a critical understanding and on hand experience on dealing with Waveguide Grating Coupler; Semiconductor Laser and their dependence on Temperature; Single and Multimode fibers, their properties and how to couple them with free space light source; Fiber losses through the transmission line; and how Laser sensors operate. Besides the students will have a familiarity with different equipments and know how to use them in dealing with lasers and fiber optics. To prepare students for more advanced courses in fiber and integrated optics.

Learning Objectives: At the end of the course, student will be able to:

1. Couple a free-space laser beam to a planer waveguide, using a grating coupler and find effective index of the waveguide by measuring resonant coupling angle and find a thin film refractive index and thickness using data obtained from the experiment.

2. Measure light-current characteristics of a semiconductor laser and calculate different parameters using the obtained data.

3. Couple a free space laser beam to single and multimode fibers, measure the angular distribution of light coming out of the fiber, evaluate normalized frequency and index step of the fiber using data obtained from the lab.

4. Apply wavelength multiplexing technique using a beam splitter, cut an optical fiber and evaluate the
quality of the cut and measure the losses in transmission lines.

5. Work with the laser beams produced by the laser, operate with fiber-based sensors and quantify the sensor’s output.

Textbook: none

Reference Text: none

Lab Manuals: provided by the instructor

Prerequisites by Topics:
1. Fiber Optics, ECE 4850 or Fiber Optic Networks, ECE 5870

Corequisites by Topics: none

Course Structure:

1. Lab # 1: Waveguide Grating Coupler
2. Lab # 2: Semiconductor Laser
3. Lab # 3: Single and Multi-mode Fiber
4. Lab # 4: Fiber Losses
5. Lab # 5: Proximity and Microbend Displacement Sensors

Report Format:

The Lab Reports are small design and/or analysis projects. Computer simulation will be required. No restriction on the programming language. Final result must be presented by computer-generated graphs. No hand-written reports will be accepted.

Computer Resources:

To work on home projects, students may use any tool that allows for numerical simulations based on simple algebraic or differential equations (Matlab, Mathead, Origin, C, C++, e.t.c.). Computers are available in Engineering PC Lab as well as in libraries on campus.

Class policy: General WSU policies applied. No withdrawal after fourth week of classes.

Distribution of Points: (change will be announced)

5 Lab Report 100pt

Grading Scale:

95-100 A
90-94  A-
86-89  B+
80-85  B
75-79  B-
70-74  C+
65-69  C
60-64  C-
50-59  D
Below 50  E

Attendance:

Class attendance will affect the final grade directly as this is a lab class. On time Lab Report is mandatory. Conflict of the schedule with other your assignments either at University or at work will not be considered as excuse for missed class or exam except under extraordinary circumstances. No make-up quizzes/exams will be administrated. Students who missed one quiz may apply in written for averaging his/her score based on other assignments.

Schedule:

Outcome Coverage:

(a) An ability to apply math, science and engineering knowledge. The lab reports require direct application of mathematical, scientific, and engineering knowledge to successfully complete the course.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. This outcome is a minor. The system design problems will largely be technical and to some degree economical, rather than social, political, ethical, etc.

(e) Identify, formulate and solve engineering problems. The course is primarily oriented toward fiber optic communication networks. Students must be able to identify the system, formulate models describing the system components and the system in general, and analyze the system performance.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. Students taking the course will apply numerical methods for modeling fiber optic communication devices and systems.

Cheating Policy and Penalty for Cheating:

On quizzes and exams every student is given freedom to use any material he/she has prepared. Coping and giving your work for coping will be considered as cheating. The highest penalty is a grade of F for the course and report to the Dean’s office for further prosecution. No excuse at any circumstances.

Prepared by: Ivan Avrutsky, Associate Professor of Electrical and Computer Engineering

Last Revisited: December 08, 2006