ECE 5870 Fall 2015 Syllabus

No: ECE 5870

Title: Optical Communication Networks

Credits: 4 (lectures)

WSU Catalog Description: Prereq: ECE 4700; 4850. Laser and detectors; modulation and demodulation; optical transmitters and receivers; optical filters; optical amplifiers; architecture and network control; multiaccess networks; FDDI networks, SONET/SDH, ATM, system performance.

Coordinator: Ivan Avrutsky, Associate Professor of Electrical and Computer Engineering

Instructor: Ivan Avrutsky, Associate Professor of Electrical and Computer Engineering

Office Hours: Tuesdays, Thursdays 2:30 p.m. – 3:30 p.m.

Office: 3142 Eng Building

Phone: (313) 577 4801, Email: ivan.avrutsky@wayne.edu

Course Meeting Time: Tuesdays, Thursdays 3:30-5:20, 09/03/2015 – 12/17/2016

Course Meeting Location: 1151 Main

Goals: To develop a critical understanding of the current stage of optical communication networks including some recent trends in research and development of new concepts in optical communication. 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. Analyze physical parameters of optoelectronic components and judge if a given set of components can be used in a network.
2. Analyze physical layer of an optical network and find the bottleneck limiting the information capacity.
3. Design optical links and simple optical networks.


Reference Text: none

Prerequisites by Topics:

1. Introduction to Communication Theory, ECE 4700
2. Fiber Optics, ECE 4850

Corequisites by Topics: none

Topics:

1. Introduction to Optical Networks
2. Building blocks of Optical Networks
3. Optical Networks: Technology, Topology, Control and Management
Detailed schedule of lectures, quizzes and exams is attached.

**Course Structure:**
- 16 lectures on the subject of optical communication networks given by the instructor
- 5 lectures covering sample problems and homework assignments
- 4 lectures reserved for Quizzes (2), Midterm Exam, and Final Exam
- 1 lecture reserved for students’ presentations based on recent review papers

**Homework Report Format:**
- The Homework assignments 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 allow for numerical simulations based on simple algebraic or differential equations (Matlab, Mathcad, C, C++, e.t.c.). Computers are available in Engineering PC Lab as well as in libraries on campus.

**Laboratory Resources:** none

**Class policy:** General WSU policies applied.

**Distribution of Points:**
- 2 Homework 10pt
- 2 Quizzes 20pt
- Midterm 30pt
- Final 40pt

**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 does not affect the final grade directly. However, at the sole discretion of the instructor, students contributing to learning process through active participation in the class discussions may be awarded a few extra points. Attending of quizzes/exams is mandatory. Dates for quizzes (2) and exams (2) as well as due dates for homework assignments (2) are announced in the schedule. Students who missed one quiz may apply for averaging his/her score based on other assignments.
Schedule: attached below

Outcome Coverage:

(a) An ability to apply math, science and engineering knowledge. The quizzes, homework assignments, and exams require direct application of mathematical, scientific, and engineering knowledge to successfully complete the course. This mainly requires knowledge of algebra, ordinary differential equations, partial derivatives differential equations, statistics, and Fourier transforms.

(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. Use this freedom wisely. Coping and giving your work for coping will be considered as cheating. Computers, smartphones, and other communication tools will not be allowed during quizzes and exams.

Accommodations for Students with Disabilities:

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please refer to the SDS website for further information about students with disabilities and the services we provide for faculty and students: http://studentdisability.wayne.edu/

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

Last Revisited: August 31, 2015