OPTI 430/530
OPTI 530/430

Optical Communication Systems

- Course Type: Graduate Course, Undergraduate Course
- Semester Offered: Fall

Course Number:
OPTI 430/530

Course Number:
OPTI 530/430

Units:
3

Distance Course:
Yes

Course Description:
Physics of optical communication components and their applications to communication systems. Topics include signal propagation through optical fiber with linear and nonlinear effects, optical signal generation and modulation, optical signal amplification, photo detection and noise generation, optical receiver design, bit error rate calculations, and system performance evaluation.

Days and Times:
Tuesday and Thursday 12:30-1:45 p.m.

Room Number:
Meinel 307

Instructor(s):
Milorad Cvijetic

Contact:
milorad@optics.arizona.edu | 626-1778 | Meinel 429

Office Hours:
Tuesday and Thursday 1:45 p.m.- 3:00 p.m.
Textbooks:

**Required**

Grading Policy:

Homework: 20%
Midterm Exam: 30%
Final Exam: 50%

Homework assignments will be given biweekly. Solutions will be discussed on Thursdays.

Final exam will be given at the end of the semester.

Working in study groups can be beneficial if everyone participates. Therefore, while working in study groups is allowed and even encouraged, all work submitted for a grade must be your own. When this rule is violated, the guilty student will receive a grade of zero on the offending item. Cheating will not be tolerated.

Course Syllabus:

**Outline**

Introduction to Optical Communications and Networks

Optical Fibers
- Geometrical-Optics Description
- Wave Propagation
- Chromatic Dispersion
- Polarization Mode Dispersion
- Dispersion-Induced Limitations
- Fiber Losses
- Nonlinear Optical Effects

Optical Transmitters, Modulators
- Light-Emitting Diodes
- Semiconductor Lasers
- Control of Longitudinal Modes
- Laser Characteristics
- Transmitter Design
- Mach Zehnder and Electroabsorption Modulators
Optical Receivers

- Common Photodetectors
- Receiver Design
- Receiver Noise
- Receiver Sensitivity
- Sensitivity Degradation
- Receiver Performance

Optical Amplifiers

- Semiconductor Optical Amplifiers
- Raman Amplifiers
- Erbium-Doped Fiber Amplifiers
- System Applications

Lightwave Transmission Systems

- Intensity Modulation - Direct Detection Systems
- Homodyne and heterodyne detection
- Modulation formats: ASK, FSK, PSK, QAM
- Demodulation schemes
- Polarization multiplexing
- Coherent OFDM systems
- Bi-error rates and receiver sensitivity
- Sensitivity degradation
- System performance

Multichannel Systems

- WDM Lightwave Systems and Components
- WDM System Performance Issues
- Orthogonal Frequency Division Multiplexing (OFDM)

Optical Transmission Enabling Technologies

- Dispersion Management
- Modulation Formats
- Nonlinearity Management
- Wavelength Conversion
- Optical 3R
- Forward Error Correction

Optical Networks

- Access and Metro Networks
• Long-Haul Networks
• Design Guidelines

Academic Integrity

According to the Arizona Code of Academic Integrity, “Integrity is expected of every student in all academic work. The guiding principle of academic integrity is that a student’s submitted work must be the student’s own.” Unless otherwise noted by the instructor, work for all assignments in this course must be conducted independently by each student. Co-authored work of any kind is unacceptable. Misappropriation of exams before or after they are given will be considered academics misconduct.

Misconduct of any kind will be prosecuted and may result in any or all of the following:

• Reduction of grade
• Failing grade
• Referral to the Dean of Students for consideration of additional penalty, i.e., notation on a student’s transcript re: academic integrity violation, etc.

Students with Learning Disabilities

If a student is registered with the Disability Resource Center, he/she must submit appropriate documentation to the instructor if he/she is requesting reasonable accommodations.

The information contained in this syllabus may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.