

## ECE 483 – Guided Wave Optics

**Catalog Description:** Optical waveguides, optical fiber mode structure and polarization effects, fiber optical communication systems, fiber sensors, integrated optoelectronic devices. (Cross-listed as PH 483)

**Credits:** 4                      **Terms Offered:** Spring

**Prerequisites:** ECE 391X or PH 481 (concurrent enrollment acceptable)

**Courses that require this as a prerequisite:** None

**Structure:** Three 50-minute lectures plus one 3-hour lab per week

**Instructors:** T. Plant (primary), A. Weisshaar (secondary)

### Course Content:

- Overview and safety issues of lasers and optical fibers: eyes, shocks, burns, splinters
- Photodetectors: physics, spectral and time response, circuit issues, noise
- Review of basic optics, laser mode properties, dispersion, data rates
- Planar dielectric waveguides and integrated optics
- Optical fiber waveguides: properties and fabrication
- Sources, modulation, system components, and system design
- Fiber sensors

### Measurable Student Learning Outcomes:

At the completion of the course, students will be able to...

1. **Explain** the operation of LEDs, laser diodes, and PIN photodetectors (spectral properties, bandwidth, and circuits) and analyze their response in optical systems (ABET Outcomes: A, E, m)
2. **Explain** the principles of, compare and contrast single- and multi-mode planar and fiber optical waveguide characteristics (ABET Outcomes: A, E, m)
3. **Analyze and design** optical communication and fiber optic sensor systems (ABET Outcomes: A, C, E, m)
4. **Design, build, and demonstrate** a team optical fiber application project in the laboratory (ABET Outcomes: A, B, C, d, E, G, o)
5. **Locate, read, and discuss** current technical literature dealing with optical fiber systems (ABET Outcomes: a, G, i, j)

### Learning Resources:

- Palais, Joseph C., *Fiber Optic Communications*, 4th Ed, Prentice-Hall, 1998
- Class notes

### Students with Disabilities:

Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible

for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

**Link to Statement of Expectations for Student Conduct:**

<http://oregonstate.edu/admin/stucon/achon.htm>

Revised: 5/24/07