ECE 482 – Optical Electronic Systems

Catalog Description: Photodetectors, laser theory, and laser systems. (Cross-listed as PH 482)

Credits: 4 **Terms Offered:** Fall

Prerequisites: ECE 391X or PH 481 or equivalent

Courses that require this as a prerequisite: ECE 592

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

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

Course Content:
- Safety issues of laser radiation and optoelectronic systems: eyes, shocks, burns
- Photodetectors: PMT, photoconductors, PIN photodiode
- Overview of lasers: history, current and future markets, stimulated emission, modes – transferse and longitudinal, gain profile
- Physics of laser gain, gain equation
- Gaussian beam propagation and optical cavities
- Transient effects – gain saturation, rate equations, Q-switching, mode-locking
- Common commercial laser systems: physics, technology, and performance
- Laboratory experiments: safety and photodetectors (CdS photoconductor and Si PIN photodiode); transverse modes and alignment of He-Ne laser; Gaussian beams; lineshapes and use of monochrometer and lock-in amplifier; Fabry-Perot scanning interferometer and He-Ne laser longitudinal modes; semiconductor diode lasers and LEDs; team design project: design, fabrication, demonstration, and reporting

Measurable Student Learning Outcomes:
At the completion of the course, students will be able to…
1. **Analyze and design** PIN photodetector circuits (ABET outcomes: A, C, E, m)
2. **Analyze and design** laser optical cavities to meet output beam specifications (ABET outcomes: A, C, E, m)
3. **Analyze and design** optical electronic systems (ABET outcomes: A, C, E, m)
4. **Design, fabricate, test, and document** a team optical electronic project (ABET outcomes: A, B, C, d, E, G, K, o)
5. **Read and summarize** current technical journal papers in optical electronics (ABET outcomes: a, G, i, j, O, Q)

Learning Resources:
- Kuhn, Kelin J., *Laser Engineering*, Prentice-Hall, Inc., 1998

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: 5/21/07