

**CALIFORNIA INSTITUTE OF TECHNOLOGY**  
**Applied Physics**  
**Aph 132 Optoelectronic Materials and Devices**  
**Spring Term 2006**

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**Description:**

Aph 132 an introductory lecture and problem course dealing with optoelectronic devices, their physical underpinnings and their applications. Topics include wave propagation in dielectric media(interference, waveguides, resonators), photon field-dipole interactions (spontaneous emission, stimulation emission, absorption), device physics of many optoelectronic devices, and optical response of matter (dielectric response, nonlinear susceptibilities, nonlinear optical phenomena and devices).

**Staff:**

Faculty: Harry A. Atwater, 246 Watson, x-2197, [haa@caltech.edu](mailto:haa@caltech.edu)

Teaching Assistants: Jennifer Dionne, 248 Watson, x-2380, [jdionne@caltech.edu](mailto:jdionne@caltech.edu)  
Carrie Ross, 244 Watson, x-3826, [rossc@caltech.edu](mailto:rossc@caltech.edu)

Course Secretary: April Neidholdt, 256 Watson, x -3330, [apriln@caltech.edu](mailto:apriln@caltech.edu)

**Class Materials:**

Recommended Texts:

- **Fundamentals of Photonics**, B.E.A. Saleh and M.C. Teich; 1 edition, Wiley-Interscience (1991) **ISBN: 0-471-83965-5**. *This text has a very wide topical coverage; similar to Cohen-Tannoudji "Quantum Mechanics", you will find a description of almost every phenomenon in photonics here.*
- **Photonics : Optical Electronics in Modern Communications**, A. Yariv and P. Yeh, Oxford University Press, USA; 6<sup>th</sup> edition (2006) **ISBN: 0195179463**  
*Covers essentials for photon-field-dipole interactions and optoelectronic devices for communications*
- **Semiconductor Optoelectronics: Physics and Technology**, Jasprit Singh, McGraw-Hill Companies (March 1, 1995), **ISBN 0070576378**. *This book covers the device physics of optoelectronic devices well; very readable narrative approach.*

**Aph 132 Policies:**

1. Collaboration policy: limited collaboration; this means you are welcome to discuss problems and concepts with fellow students verbally, but you should not share written work.

2. Midterm exam will be open book but limited time format (2 hours): Week of April 25th, 2005 exam will be available at 12 noon on date issues and is due by 12 noon the next day.
3. Final Exam will be issued during the Final Examination period, 3 hours
4. Homeworks will be issued on Fridays and are due the following week on Friday (i.e., 7 days later). Homework tutorials sessions T, Th 5 pm, 250 Watson. Late homeworks will be scored according the relation:

$$\text{Homeworkscore}(t) = \text{Homeworkscore}(\text{Due date})e^{-(t-\text{Due date})/7\text{days}}$$

5. Course grades will be weighted as follows:

Homeworks	50%
Midterm Exam	25%
Final Exam	25%