

## **EE234: Photonics Laboratory**

**Instructor: Jelena Vuckovic**

**Winter 2008/2009**

Lectures: Mon Fri 1:15-2:05pm  
Building 160, Room 323

Lab: Wed 1-5pm, Packard 066

Class web-site (linked from JV's site)

<http://www.stanford.edu/class/ee234/>

(lecture notes and assignments are posted on the coursework portion of the class website)

Instructor's coordinates:

Ginzton Lab, office 1

Phone: x5-2288, E-mail: [jela@stanford](mailto:jela@stanford) ,

WWW: <http://www-ee.stanford.edu/~jela>

Instructor's office hours

Fridays, 11am – 12:30pm, Ginzton 1

TA's:

1. Bryan Ellis (bryane)

2. Andrei Faraon (faraon)

Office hours: TBA

*Location of office hours:* Ginzton 31

Administrative staff:

Ingrid Tarien

ingrid@ee

location: Applied Physics #211

phone: (650) 723-0206

Course materials

- Lecture notes will be posted on the class web site.
- There are no required textbooks.
- Recommended textbooks:
  - B. Saleh and M. Teich, Fundamentals of Photonics (1<sup>st</sup> edition available online at: <http://www3.interscience.wiley.com/cgi-bin/bookhome/88511919/?CRETRY=1&SRETRY=0> )
  - A. Yariv, “Optical electronics in modern communications
  - L. Coldren and S. Corzine, “Diode lasers and photonic integrated circuits”

### Homework

- Weekly homework: will be posted on the class web site (on Fridays), and solutions will be due one week later (Fridays @2pm).
- Late homeworks will be graded according to the following formula:

$$s(t) = \begin{cases} s(0) \cdot e^{-t/14}, & 0 \leq t < p \\ 0, & t \geq p \end{cases},$$

where  $t$  is the time when homework is turned in (measured in days from the due date  $t=0$ ),  $s(t)$  is the homework score as a function of time,  $s(0)$  is the homework score on the due date, and  $p$  is the time when solutions are posted on the class web site (measured in days from the due date).

Exceptions to grading according to this formula are possible in special circumstances, by contacting the instructor.

### Prelabs

Prelab questions will be posted online weekly and your answers will be due at the beginning of the lab session on Wednesday.

### Lab reports

Lab reports are due on Wednesday at 5 PM one week after the completion of the experiment. They should be submitted electronically (by e-mail) to the TA in charge of the experiment and the instructor.

Lab reports should be written in the format posted on the course website.

Each team writes and submits one report. Therefore, you should share writing responsibilities with your lab partner.

### Exams

No exams

### Honor code

Discussion with others is strongly encouraged, but you are not allowed to copy somebody else's homework solution or prelab, use any sources that contain the answer to an assigned problem or one very similar to it.

Lab reports writing is shared with your lab partner

### Grade distribution:

Homework = 30%

Prelabs = 10%

Lab work = 30%

Lab reports = 30%

### Tentative class schedule

<b>Week</b>	<b>Monday</b>		<b>Wednesday</b>		<b>Friday</b>	
<b>1</b>	01/05	No class	01/07	Meet in the lab (Packard 066) to discuss Lab safety, assign lab partners, overview of the lab and the class (no lab this week)	01/09	<u>Lecture 1</u> : Semiconductor LEDs and lasers
<b>2</b>	01/12	<u>Lecture 2</u> : Laser rate equations; L-I curve; laser threshold; laser modulation	01/14	<u>Lab 1</u> : Semiconductor lasers: L-I characteristics (Prelab 1 due)	01/16	<u>Lecture 3</u> : Photodetectors (Homework 1 due)
<b>3</b>	01/19	<u>No class</u> (Martin Luther King Jr. Day Holiday)	01/21	<u>Lab 2</u> : Photodetectors: Sensitivity, Bias, and Bandwidth (Prelab 2 & Lab report 1 due)	01/23	<u>Lecture 4</u> : Photodetectors (Homework 2 due)
<b>4</b>	01/26	<u>Lecture 5</u> : Trans-impedance Amplifiers	01/28	<u>Lab 3</u> : Trans-impedance Amplifiers (Prelab 3 & Lab report 2 due)	01/30	<u>Lecture 6</u> : Beams, free space propagation (Homework 3 due)
<b>5</b>	02/02	<u>Lecture 7</u> : Beams, free space propagation (cont'd)	02/04	<u>Lab 4</u> : Laser Mode Size Measurements (Prelab 4 & Lab report 3 due)	02/06	<u>Lecture 8</u> : Modes in optical waveguides (Homework 4 due)
<b>6</b>	02/09	<u>Lecture 9</u> : Optical fibers	02/11	<u>Lab 5</u> : Laser-To-Fiber Coupling (Prelab 5 & Lab report 4 due)	02/13	<u>Lecture 10</u> : Optical fiber modes, fiber coupling (Homework 5 due)
<b>7</b>	02/16	<u>No class</u> (Presidents' Day Holiday)	02/18	<u>Lab 6</u> : Optical Fiber Modes (Prelab 6 & Lab report 5 due)	02/20	<u>Lecture 11</u> : Optical fiber modes (cont'd) (Homework 6 due)
<b>8</b>	02/23	<u>Lecture 12</u> : Directional couplers and isolators	02/25	<u>Lab 7</u> : Fiber terminations, connectors, and splices (Prelab 7 & Lab report 6 due)	02/27	<u>Lecture 13</u> : Tunable lasers, OSAs, reflectivity measurements (Homework 7 due)
<b>9</b>	03/02	<u>Lecture 14</u> : Photonic crystals, photonic band gap	03/04	<u>Lab 8</u> : Photonic crystals (Prelab 8 & Lab report 7 due)	03/06	<u>Lecture 15</u> : Photonic crystals (cont'd) (Homework 8 due)
<b>10</b>	03/09	<u>Lecture 16</u> : Photonic crystals, nanophotonics	03/11	<u>Lab 8</u> : Photonic crystals (cont'd)*	03/13	<u>Lecture 17</u> : Photonic crystals, nanophotonics

\* Lab report 8 due one week after you complete the lab