San José State University  
Department of Physics and Astronomy  
Physics 168: Lasers and Applications, Fall 2015

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<tr>
<th>Instructor:</th>
<th>Ken Wharton</th>
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<td>Office Location:</td>
<td>SCI 308</td>
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<td>Telephone:</td>
<td>(408)-924-5257</td>
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<tr>
<td>Office Hours:</td>
<td>Wed 8:30-10:30am, or by appointment</td>
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<td>Class Days/Time:</td>
<td>TR, 10:30-11:45am</td>
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<td>Classroom:</td>
<td>SCI 326</td>
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<td>Prerequisites:</td>
<td>Physics 122</td>
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**Faculty Web Page**

The course materials such as the syllabus, handouts, etc. may be found on my faculty web page at http://www.sjsu.edu/people/kenneth.wharton/courses/168/ or http://tinyurl.com/l5xltq2. It should also be accessible through the "Courses" link on my SJSU home page.

**Course Description**

This is a comprehensive introduction to the properties of lasers and Gaussian light beams. We will cover principles of laser operation and design, as well as a wide variety of applications.

**Homework**

Solving a vast majority of the homework problems is crucial for success in this course. Homework will be assigned on a weekly basis; in general late homework will not be accepted. See the bottom of the greensheet for further advice.

**Textbook**

The required textbook for this course is "Principles of Lasers" (fifth edition) by Orazio Svelto (Springer).
Course Goals and Student Learning Objectives

Your learning objectives are to learn the concepts behind the above topics with sufficient understanding as to solve new quantitative problems that you have not yet encountered. This includes learning the mathematical approaches necessary for solving such problems.

Classroom Protocol

I expect you to attend class, as this material is almost impossible to learn directly from a textbook, and there is a very strong relationship between class attendance and performance.

Cell phones, of course, must be silenced.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester’s Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic calendar web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

Exams, Assignments and Grading Policy

There will be two midterm exams, a Research Project, and one comprehensive final exam.

Research Project: Each of you will choose a topic that interests you, concerning current or future applications of lasers, or find a relevant popular-science article in a notable magazine or newspaper. I will then assign a specific project for a short research paper, individually tailored to your topic. After the paper is turned in, you will make a short, related presentation to the class. Further details will be forthcoming.

The final grade will be determined according to the following:

Grading:  
- Homework: 20%
- First Midterm: 15%
- Second Midterm: 20%
- Research Paper and Presentation: 20%
- Final: 25%

The mean score in the class will generally be a B.
University Policies

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University’s Academic Integrity policy, located at http://www.sjsu.edu/senate/S07-2.htm, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person’s ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU’s Academic Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the Disability Resource Center (DRC) at http://www.drc.sjsu.edu/ to establish a record of their disability.

Peer Assistance / Office Hours

Your success in this course almost entirely depends on learning how to do the homework problems, so do whatever it takes to make this happen. For most of you, this is best done in homework groups (although of course all the work you turn in must be your own). Also, please take advantage of my help via email and in office hours (either the posted hours above, or else make an additional appointment) – and not just for solving the homework, but also for understanding the material.
Phys 168 / Fall 2015 Course Outline

This schedule is approximate; Midterm dates are subject to change with fair notice.

Weeks 1/2: Light, Light-Atom Interactions, and Lasers. (Overview)
Week 3: Einstein coefficients, Line broadening, Saturation (Chapters 1, 2)
Week 4: Ray Propagation, Fabry-Perot Interferometer (Chapter 4.2,4.5)
Week 5: Stable Cavities (Chapter 5)
Week 6: Review, Midterm #1, THURSDAY 9/24
Week 7: Gaussian Light Beams (Chapter 4.7)
Week 8: Gaussian Beams, Pumping (Chapter 4,7,6)
Week 9: Oscillation, CW lasers (Chapter 7)
Week 10: Oscillation, CW lasers (Chapter 7)
Week 11: Pulsed Lasers (Chapter 8)
Week 12: Pulsed Lasers (Chapter 8), Review
Week 13: (Midterm #2 on Tuesday 11/10), Particular Lasers (Chapter 9)
Week 14: Particular Lasers (Chapters 9,10)
Week 15: Research Paper Due on Tuesday 11/24. (No class on Thanksgiving)
Weeks 16/17: Student Presentations, Review

The Final will be on Wed. Dec 16, 9:45am-Noon, unless we reschedule.