

Physics 3750/3701: Laser Physics
Austin Peay State University
Department of Physics and Astronomy

Course Syllabus
Fall 2007

Instructor: Dr. Kevin Schultz
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Office Hours:
MWF 11:00AM-1:00 PM or by appointment.

Meeting Times:
MWF 1:25 – 2:25 PM SSC B107

To be properly enrolled in this course, you must be registered in the lecture section (PHYS 3750, section 11, CRN 3682, 3 credit hours).

Prerequisites: Co-requisite: PHYS 3700 or permission of instructor.

Text:
Laser Fundamentals 2nd ed., William Silfvast, 2004. ISBN 0 521 83345-0

Course Description:
This class will introduce the relevant physics to describe how lasers work. Topics include, but are not limited to: Linear interaction of light and matter, how atoms emit light and how external processes affect light emission, black-body radiation, cavity radiation, absorption and stimulated emission of light, the conditions necessary for a laser to operate, laser oscillation, laser resonators, special laser cavities, and non-linear interaction of light and matter

Course Objectives:
The purpose of the course is to help students:

1. Obtain an understanding how light interacts with matter
2. Learn rate equations in both the transient and steady-state
3. Understand the physical conditions for laser operation

Physics cannot be memorized! To be a successful student in physics (and elsewhere) it is required that you learn how to think effectively. In this course, you will be introduced to analytical thinking. This is not something that comes easy, or is something that is fully developed at the end of the course. It is something that you will hopefully hone for the rest of your life. It is hoped that at the end of the course, you will have some of the tools required for such an undertaking. Developing these skills requires you to read the textbook (including the examples presented in the book which are fair game for tests!), attend class, and practice, practice, practice (working problems). Although this may seem daunting, it is not beyond the capabilities of anyone in this class. *Finally, it is important to ask questions.* You can **never** be penalized for asking questions. This may be the most difficult thing to learn in this class, but if you get over your shyness you will find it to be the most helpful lesson.

Course Requirements:
Lectures – Each student is responsible for the material and announcements presented in the lectures. I intend to follow the text; however, I will not necessarily discuss topics in the same order

as the text, and I intend to skip certain sections of the text. Also, lecture will include some topics not covered in the text as well as in-class demonstrations.

Homework – Objective sheets will be handed out on the first day of classes and immediately following each exam. The objective sheet will consist of reading assignments, and problem sets from the text. Each student must turn in a homework folder immediately before each exam. The folder should include (in this order):

1. Answers to any assigned conceptual questions. An explanation or description of why each answer is correct should be included.
2. Worked exercises. Complete work for each exercise must be shown for credit.

The folders will serve as study guides for the exams! **Late assignments will not be accepted.** Assignments may be worked on in groups, but each student must turn in or present his or her own solutions. Be advised that the number of problems assigned **may not** be sufficient for a thorough understanding of the material. You should work as many of the unassigned problems in the text as necessary for you to feel comfortable with the topic at hand.

Exams – There will be four exams during the semester. The exams will be one-hour exams, dates for which are given in the Outline. The exams will consist of approximately 50% problem solving questions and 50% conceptual questions (multiple choice and short answer).

Final –The final will consist of an approximately 10 minute talk and a short paper on a particular topic in laser physics. Details and assignment of talk will be discussed later in the semester.

Grading – You may always submit an assignment for a re-grade if you believe I have made an error, but be warned, I reserve the right to re-grade the entire assignment. The final grade for this course will be determined using the percentages below and a standard 10-point grading scale. Your actual letter grade may be determined from a curve based on the overall class performance (don't worry, this curve can only better your grade).

- Exams 15% each (60% total)
- Homework and Participation 20%
- Presentation and paper 20%

Attendance Policy:

APSU allows individual faculty members to set their own attendance requirements. I will not be taking attendance each meeting, but in such small classes it will be obvious to me who is attending classes each day. Remember homework and participation make up 20% of your final grade. Also keep in mind that it is not enough to read the book, the professor has a roll in teaching as well. Finally, keep in mind that any makeup assignments for missed tests, homework, or presentation will be offered at my discretion. Do not assume that there will be automatic makeup assignments.

Disability Policy:

Any student who has a disability that may affect his or her academic performance is encouraged to make an appointment with me to discuss this matter, or you may contact Disability Services at telephone 221-6230 voice, 221-6278 voice TTY.

Academic and Classroom Misconduct:

Students are expected to conduct themselves appropriately at all times. Academic and classroom misconduct will not be tolerated. Students must read the “Code of Student Conduct” in the current Student Handbook for an understanding of what will be expected of them within the academic setting.

You may not bring unauthorized materials of any kind to any of the quizzes or exams. This includes, but is not limited to, storing formulas in a programmable calculator. Blatant copying of any problem solution from any source is forbidden.

If you have any questions or concerns regarding a topic covered in this syllabus, please ask me to clarify!

(The above schedule and procedures are subject to change in the event of extenuating circumstances.)