

PHYSICS 518

Advanced Topics – Optics

Syllabus – Spring 2008

INSTRUCTOR Dr. Eduardo Sánchez Velasco.

OFFICE

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Note: Do not use the phone or e-mail for grade related questions.

OFFICE HOURS

Monday, : 11:30 a.m. – 12:30 p.m.

Wednesday: 11:30 a.m. – 1:30 p.m.

Friday: 11:30 p.m. – 1:30 p.m.

These are my official office hours, but frequently I am in my office at other times; you should feel free to stop in at any time, or to make an appointment, if this is more convenient.

CLASS HOURS

LECTURE: Monday, Tuesday, Wednesday and Friday, 1:30 p.m. – 2:20 p.m. in Magruder Hall 3000.

CATALOG DESCRIPTION

An in-depth study of selected science topics presented under formal classroom organization (not intended for individualized study)

TEXT:

The required text for this course is:

- *Fundamentals of Photonics* (2nd ed), by B.E.A. Saleh and M.C. Teich; Wiley-Interscience (2007).

ACADEMIC DISHONESTY

Academic dishonesty of any form will not be tolerated in this class. Anyone caught cheating on a test, homework, or lab will automatically receive a grade of zero on that test, homework or lab. Further disciplinary action consistent with University policy will be considered, including failing the course. Homework, exams and quizzes, unless instructed otherwise, must be done individually. For more information about the University policy on academic dishonesty, consult the appropriate sections of the Student Conduct Code (see the code at <http://saffairs.truman.edu/studentconductcode.asp>).

STUDENTS WITH DISABILITIES

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Disability Services office (x4478) as soon as possible.

ATTENDANCE AND HOMEWORK POLICY:

Although students are expected to attend all class sessions, I will not check for attendance. There will be homework assignments during the course. Unless otherwise indicated, homework should

be done individually. I will consider academic dishonesty homework done in group or copied from any source. **No late homework will be admitted without a valid excuse.** You must turn in your homework **in person** at the **beginning** of the class session in which they are due, unless you have a valid reason not to attend the class. Homework handed in after the class has started will be considered late homework. I will consider academic dishonesty to have some one turn in your homework assignment for you. If you have a valid reason not to attend a class, and a homework assignment is due that day, you should turn in your homework personally to me, preferably BEFORE the class. You will have to justify to me in person the reason for your absence. Remember: homework will be due BEFORE the class begins, so do not be late.

EXAMS:

There will be four closed book exams and two lab exams in this class. The tentative exam dates are listed at the end of this syllabus. All exams, **including the final** (exam #4), will be on the material covered since the preceding test. That is, they are not “comprehensive”. However, you may have to use as background for one exam material covered in previous exams. In addition to these exams there will be occasional quizzes.

MISSING A TEST, QUIZ OR CLASS:

If you have a valid conflict that does not allow you to take an exam or quiz at the scheduled time **contact me as soon as possible**, preferably BEFORE the test takes place. In any case you should see me in person as soon as possible. Missing a test requires a valid excuse, otherwise a grade of zero will be assigned. I reserve the right to determine what is, and is not, a valid excuse. As a rule only extreme situations, like serious medical problems, will be considered valid excuses. In general, having other exams in the same day is not a valid excuse. You are also responsible for showing on time to exams or class. Being late to an exam or quiz may disqualify you from taking that exam or quiz. Field trips and sport events are not usually considered valid excuses unless previously arranged personally with me. Alarm clock malfunctions and similar events are NOT considered valid excuses. The exact date of a quiz will be announced in a previous class, some times the day before the quiz. It is your responsibility to know that date. If you miss a class make sure to ask if a quiz was announced in it. “I did not know there was a quiz today” is NOT a valid excuse for missing a quiz. The same applies to changes of date or time of an exam, date of due homework, or the content of the exams and quizzes. Adjustments to make up missed exams or quizzes, if any, will be made at my discretion, and only in extreme situations.

GRADING POLICY:

The grade for this class will be obtained from 4 exams and from homework assignments and quizzes. Each exam will count 17.5% towards the final grade, homework and quizzes the remaining 30%. Unless indicated otherwise, each homework problem will have a value of 10 points and each quiz will have the same value as a homework problem (10 points). You **MUST** keep all graded materials, and be able to produce them in case of grade disputes.

| | |
|----------------------|-------|
| Homework and quizzes | 30.0% |
| Exam #1 | 17.5% |
| Exam #2 | 17.5% |
| Exam #3 | 17.5% |
| Exam #4 | 17.5% |
| <hr/> | |
| Total : | 100% |

The minimum guaranteed grading scale is as follows:

| Final Percentage | Final Letter Grade |
|------------------|--------------------|
| 90 to 100 | A |
| 80 to 90 | B |
| 70 to 80 | C |
| 60 to 70 | D |
| below 60 | F |

Final letter grades are normally assigned according to the table above. However, depending on class performance, or to reward class participation, at the end of the semester I may curve grades upward. If this curving is done and, for example, I add 1% to the final grade, a person with a final percentage of 79% may receive a B as a final letter grade, even though the above table indicates that a C would normally be assigned. However, **curving is not guaranteed, and you should not count on it.** I will never curve downward. As a rule, only the grades in the above table (A, B, C, D or F) will be given. Any other grade, like incomplete (IC), will be given at my discretion, and only under **very unusual and extreme circumstances**, like a serious medical problem. Poor performance will not qualify you for a grade other than A, B, C, D, or F.

TENTATIVE COURSE OUTLINE:

Some of the topics I intend to cover in the lectures, in their approximate order, are indicated below.

- Introduction and overview. Electromagnetic theory review. Maxwell's Equations.
- The wave equation. Plane waves, complex representation, Fourier transforms.
- Introduction to polarization. Jones vectors and matrices.
- Optics of anisotropic materials. Birefringence. Retarders. Optical activity.
- Reflection and refraction of plane waves. Fresnel equations. Total internal reflection.
- Introduction to geometric optics. Ray theory. Fermat's principle.
- Lenses, prisms, and mirrors. Simple optical instruments.
- Ray analysis of optical systems.
- Superposition of waves and interference. Interferometry.
- Scalar theory of diffraction. Kichhoff-Frenel theory of diffraction.
- Fresnel diffraction. Fraunhofer diffraction.
- Introduction to Fourier optics.
- Advanced topics: coherence theory, holography, etc...

Note that this is only a tentative list of material. I may change it to adapt to the needs of the class as we go along. The purpose of the class is for you to learn, not to follow a rigid plan. Your feedback in this matter will be very helpful. Please let me know if you think I am going too fast or too slow, or if there are topics for which you would like a more detailed explanation.

TENTATIVE EXAM DATES:

- Exam #1 Friday, February 8 in class.
- Exam #2 Wednesday, March 5 in class.
- Exam #3 Tuesday, April 8 in class.
- Exam #4 Tuesday, May 6, 1:30 p.m. – 3:20 p.m. (Finals week).

This schedule may change during the semester.