I encourage you to use the Discussion Forums on LEARN to discuss problems with the assignments or to ask questions about the course - if you are having problems, others likely are too. I will monitor the forums, normally at least once per day. Feel free to contact Prof. Campbell by email, including Phy 256 in the subject line. Emails will normally be responded to within 24 hours. Please make sure that your WatIAM ID is up to date with the email address that you use so that you receive notifications from me via Learn.

Required Text
OPTICS by E. Hecht, 4th edition.

Suggested Reference Texts
Optics, Schaum’s Outlines by E. Hecht. An inexpensive book with many solved problems. The material parallels the primary text.
PHYSICS for Scientists and Engineers by Serway or other first/second year text covering optics.
Introduction to Optics, any edition, by Pedrotti and Pedrotti. This has sometimes been used as the text for this course. There are a large number of other texts on optics at an appropriate level.

Course Description
Optics is a very active field today and it is a field with many applications in physics, chemistry, engineering and the life sciences. There is a bright future for jobs and research for those trained in optics, both in the short term for imaging and biophotonics and in the longer term for quantum optics and telecommunications. Students at Waterloo have an opportunity to take optics courses in 2nd, 3rd and 4th years from the Physics Department. Two new third year courses will be introduced next year. Optics overlaps with electromagnetism but 256 will be taught without assuming knowledge of E &M. Properties of waves, energy, momentum, force and pressure, learnt in first year Physics, will be reviewed and then applied in describing the properties of light.
**Calendar description**: Electromagnetic waves and the nature of light. Geometrical optics, aberrations. Physical Optics: interference, Fraunhofer and Fresnel diffraction, polarization. Optical instruments. We will not cover Fresnel diffraction.

**Course Prerequisite Requirements**

*Prereq: PHYS 112 or 122; One of MATH 108, 128, 138, 148.*  
*Coreq: PHYS 256L for Science students except for Mathematical Physics Plan.*  
*Antireq: PHYS 226, 246*

**Course topics**: For a more complete description of topics covered in the course, see the Course Outline on LEARN.

**Course delivery**: Most lectures will be delivered using Powerpoint. Sample problems will be solved in tutorial. There will be many demonstrations, in class and in tutorial as well as web based demonstrations. Lecture notes, additional review materials and web based demonstrations will be posted on LEARN. Assignments and solutions will be posted on LEARN. Problems solved in tutorial will not be posted. There will be a project for bonus marks.

**Course Learning Objectives**

- understand the particle/wave nature of light  
- understand the meaning of equations describing light propagation and the interaction of light and matter  
- understand the design of simple optical instruments  
- be able to visualize the optical properties of light and materials  
- be able to solve optical problems  
- appreciate the breadth of applications of optics

**Student Assessment**

There will be a **term test TBA**. Equation sheets: You will be allowed a sheet of equations in each of the midterm and final examinations. SEE THE RULES AND TEMPLATES on LEARN. FAILURE TO FOLLOW THE EQUATION SHEET RULES WILL BE DEALT WITH UNDER POLICY 71 STUDENT DISCIPLINE AS AN UNAUTHORIZED EXAM AID. **You will only be allowed to use a "Pink tie calculator" during the midterm and final exam.** The Math Faculty undergrad office will attach a sticker to your calculator. These calculators are described here: [http://math.uwaterloo.ca/math/current-undergraduates/regulations-and-procedures/calculator-regulation](http://math.uwaterloo.ca/math/current-undergraduates/regulations-and-procedures/calculator-regulation)

**Assignments**: There will be 8-11 weekly assignments during the term (1-3 to be forgiven), to be handed in to the P256 slot just outside room P211 by 4PM on the due date. Copies of solutions will be available on LEARN.
These assignments should take a maximum of a few hours. CHECK LEARN FOR DUE DATES. THE DROPBOX WILL CLOSE 24 HOURS AFTER THE DUE DATE.

Late assignments will incur a penalty of 10% a day, including the day that the assignment is due. All late assignments must be handed in online (within 24 hours) or under Prof. Campbell's door. (The door to the corridor locks at 10pm). The dropbox in Physics will not be checked for late assignments. No assignments will be accepted after the solution set has been posted online- not for 24 hours following the due date. If you wish an exception to be made, provide reasons to Dr. Campbell in person or by email before the due date of the assignment.

Grading Policy

Final Mark: best of : 25% assignments + 25% test + 50% final OR 25% assignments + 10% test + 65% final

Completing Introduce Yourself online will result in a bonus mark.
There will be another bonus assignment for 5% credit.

Accommodation

A student who misses a final exam, assignment, etc. and who provides a Verification of Illness (VIF) or other similar form (please see the information that will be needed) with a valid reason may be accommodated, at the instructor’s discretion, dependent on the severity of the situation and the student's standing in the course. Students should bring their VIFs to the Science Undergraduate Office for verification and filing and then to Dr. Campbell. If the midterm or an assignment is missed for a valid reason, the grading system will normally be modified, placing more weight on the final exam. Please feel free to discuss such situations or any other extraordinary circumstances with me, preferably in advance of the assignment, term test or exam.

Attendance Policy

Privacy statement: In order to protect their privacy, students may choose to hand in their assignments with their ID number as identifier. In order to have your assignments and term test returned in person, please attend tutorials.

Tutorials are not mandatory but you are responsible for the concepts demonstrated and the types of problems that will be solved in tutorial.

Expectations of Academic Integrity
**Academic Integrity:** In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.

Although students can learn a great deal by discussing the approach to problem assignments in group situations, it is not acceptable to copy each other's solutions nor is it acceptable to make a written solution to an assigned problem available to another student.

**Grievance:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy #70, Student Petitions and Grievances, Section 4. [http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm)

**Discipline:** A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. For information on categories of offenses and types of penalties, students should refer to Policy #71, Student Discipline, [http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm)

The Faculty of Arts has an excellent website on “Avoiding Academic Offences” or see Academic Integrity for Students.

**Appeals:** Concerning a decision made under Policy #70 (Student Petitions and Grievances) (other than petitions) or Policy #71 (Student Discipline), a student may appeal the finding, the penalty, or both. A student who believes he/she has a ground for an appeal should refer to Policy #72 (Student Appeals) [http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm)

**Guidelines on the Use of Computing Resources**

**Miscellaneous**

**WatIAM Addresses**
Students are asked to make sure that their WatIAM addresses are current by updating their data at [https://watiam.uwaterloo.ca/idm/user/login.jsp](https://watiam.uwaterloo.ca/idm/user/login.jsp). This way they may be contacted with course related info.

**Students with disabilities**

“Note for students with disabilities: The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for
students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.”

**Travel and the final examination period**

“Student travel plans are not considered acceptable grounds for granting an alternative examination time.” Exams will be held between December 6th and Dec 20th. The final exam schedule is usually posted about 5 or 6 weeks into the term, so start checking in the middle of October. More information about UW’s Final Examination policies is available [here](#).

**Revisions to this Syllabus**

Some types of course details may be revised (e.g., topics treated, emphasis on certain topics, etc.). Updates on policy from the Associate Dean may need to be added. These will also be announced in class and posted on LEARN.

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