



University of Manitoba
 Faculty of Science
 Department of Physics & Astronomy

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COURSE DETAILS

Course Title & Number:	Physics 2260 Optics
Number of Credit Hours:	3
Class Times & Days of Week:	11:30 am - 12:20 pm MWF
Location for Classes:	Buller 527
Location for Labs:	Allen Building 202
Pre-Requisites:	Not to be held with PHYS 2261. Prerequisites: A "C" or better in PHYS 1050 or PHYS 1051, or a "C+" or better in PHYS 1020 or PHYS 1021; and a "C" or better in one of MATH 1230, MATH 1500, MATH 1501, MATH 1510, MATH 1520, or MATH 1690. Prerequisite or Corequisite: one of PHYS 1070, PHYS 1071, PHYS 1030, PHYS 1031 or PHYS 2152; and one of MATH 1220, MATH 1300, MATH 1301, or MATH 1310; and one of MATH 1232, MATH 1690, MATH 1700, MATH 1701, MATH 1710.

Instructor Contact Information

Instructor Name:	Dr. J. Burgess
Office Location:	Allen Building 318
Office Hours or Availability:	Monday 1:00-2:00 PM or by appointment
Office Phone No.	204-474-6180
Email:	jacob.burgess (at) umanitoba (dot) ca All email communication must use university e-mail accounts in accordance with the Communicating with Students university policy.
Contact:	Students may contact me via e-mail, my office phone, or dropping by my office.

Laboratory Instructor Contact Information

Lab Instructor:	Antton Goicoechea
E-mail:	goicoeca (at) myumanitoba.ca
Office:	247 Allen
Lab Coordinator:	Andriy Yamchuk
E-mail:	andriy.yamchuk (at) umanitoba (dot) ca
Office:	401 Allen

General Course Information

Course Description

Physics 2260 provides a survey of refraction, reflection, simple lens systems and optical systems, dispersion, achromatism and an elementary treatment of diffraction, interference, and polarization.

Course Goals

The course aims to provide a basic understanding of optics from the point of view of ray tracing (geometric optics) and waves (physical optics). It additionally provides preparation for honours level courses such as PHYS 4590 — Advanced Optics. The course additionally aims to introduce students to rigorous and semi-independent laboratory activities to develop an understanding of how to conduct scientific investigations and experiments.

Intended Learning Outcomes

Students should develop a familiarity with the behaviour of light as well as an understanding of how this behaviour arises from the perspective of classical geometric optics and classical wave mechanics. The goal is to move beyond statements of knowledge to comprehension, application, analysis, synthesis, and evaluation. Course material will develop critical thinking skills through solution of problems, experimenting in the laboratory, and learning class materials.

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM

Learn), or any website, unless an exception to the *Copyright Act* applies or written permission has been confirmed. For more information, see the University's Copyright Office website at <http://umanitoba.ca/copyright/> or contact um_copyright@umanitoba.ca.

Recording Class Lectures

Jacob Burgess and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission from Jacob Burgess. Course materials (both paper and digital) are for the participant's private study and research.

Textbook, Readings, Materials

Required Lab Manual: PHYS 2260 Laboratory Manual Fall 2019. Available in The Bookstore.

Course Website:

http://www2.physics.umanitoba.ca/u/burgess/courses/P2260/phys2260_2019.html

Required Textbook: "Optics" by Eugene Hecht [2016], Fifth edition : Pearson Education.

Course Technology

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. The student can use all technology in classroom setting only for educational purposes approved by instructor and/or the University of Manitoba Student Accessibility Services. Student should not participate in personal direct electronic messaging / posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking (e.g. Facebook) online and offline "gaming" during scheduled class time. If student is on call (emergency) the student should switch his/her cell phone on vibrate mode and leave the classroom before using it. (©[S Kondrashov](#). Used with permission)

Class Communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:

http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf

Please note that all communication between myself and you as a student must comply with the electronic communication with student policy

(http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html). You are required to obtain and use your U of M email account for all communication between yourself and the university.

Expectations: I Expect You To

I expect you to make attendance of lectures a priority and for you to miss lectures only for exceptional circumstances. Lecture notes will be available from the course website. Study from the notes and review of prior lectures before attending a lecture is highly advised. I additionally expect you to make use of office hours ask questions about any material you found challenging, unclear, or to explore course related topics that go beyond the material presented in class.

I will be in class for 5 minutes prior to and after the class time. I will treat you with respect and would appreciate the same courtesy in return. I expect you to settle in your seat before class starts and to leave only when class is completed. See the [Respectful Work and Learning Environment Policy](#).

Academic Integrity:

Policies are attached in sections at the end of this document. Note the following.

- (i) Group projects are subject to the rules of academic dishonesty;
- (ii) Group members must ensure that a group project adheres to the principles of academic integrity.
- (iii) Students should also be made aware of any specific instructions concerning study groups and individual assignments;
- (iv) The limits of collaboration on assignments should be defined as explicitly as possible; and
- (v) All work is to be completed independently unless otherwise specified.

Expectations: You Can Expect Me To

You can expect me to deliver lectures that provide a basis from which you are able to understand the basic principles of optics. Advancing your knowledge of physics requires critical thinking and applying the techniques learned beyond the rote reproduction of the course material. You can therefore also expect me to prompt you to use independent thought to apply these principles to understand more complex optical phenomena.

Laboratory Expectations

Students having previously taken PHYS 2260 within the last two years MAY APPLY for an exemption from the laboratory component of the course in 2019, provided that their performance in the laboratory exceeded a minimum standard of 80%. To apply for an exemption, students MUST see the professor on or before September 9, 2019, and have normally completed the laboratories within the last two years. Students who receive an exemption will have their previous laboratory mark credited directly towards the 2019 mark for PHYS 2260, as outlined above.

Expectations within the laboratory are outlined in the “Lab Report Guidelines” document that will be distributed in the lab.

Class Schedule

This schedule is subject to change at the discretion of the instructor and/or based on the learning needs of the students but such changes are subject to Section 2.8 of the – [ROASS-Procedure](#).

There will be approximately one homework assignment every two weeks.

Tentative Class and Laboratory Schedule

Date		Tentative Topic	Lab	Comments
Sept. 4	W	Introduction		
Sept. 6	F	Geometric Optics		
Sept. 9	M	”	Introductory Lab Session (B01)	
Sept. 11	W	”		
Sept. 13	F	”		
Sept. 16	M	Optical Elements	Lab 1: Index of Refraction (B01)	<i>Sept. 17: Course Drop Deadline</i>
Sept. 18	W	“		<i>Course Add Deadline</i>
Sept. 20	F	”		
Sept. 23	M	”	Lab 2: Prism (B01)	
Sept. 25	W	”		
Sept. 27	F	Multiple Optics		
Sept. 30	M	“	Lab 3: Thin Lenses (B01)	
Oct. 2	W	“		
Oct. 4	F	Aberrations		
Oct. 7	M	“	Lab 4: Thick Lenses (B01)	
Oct. 9	W	Instruments		
Oct. 11	F	“		
Oct. 14	M	NO CLASS	NO LAB	Thanksgiving Day
Oct. 16	W	”		
Oct. 18	F	Light as a wave		
Oct. 21	M		MIDTERM EXAM	
Oct. 23	W	“		
Oct. 25	F	Interference		
Oct. 28	M	”	Lab 5: Aberrations (B01)	
Oct. 30	W	“		
Nov. 1	F	”		
Nov. 4	M	”	Lab 6: Newton’s Rings (B01)	
Nov. 6	W	Diffraction		

Nov. 8	F	”		
Nov. 11	M	NO CLASS		<i>Remembrance Day</i>
Nov. 13	W	NO CLASS		
Nov. 15	F	NO CLASS		
Nov. 18	M	”	Lab 7: Michelson Interferometer (B01)	<i>Vol. Withdrawal Date</i>
Nov. 20	W	”		
Nov. 22	F	”		
Nov. 25	M	”	Lab 9: Fraunhofer Diffraction (B01)	
Nov. 27	W	Polarized Light		
Nov. 29	F	”		
Dec. 2	M	”	Lab Conclusion Session	
Dec. 4	W	”		
Dec. 6	F	“		
Dec. 9-20, 2019			Exam Date TBA	Examination Period

Course Evaluation Methods

A variety of methods are used in order evaluate

Due Date:	Assessment Tool	Value of Final Grade
Oct. 21, 11:30 am, in class.	Mid-Term Test	15%
Due in 1 week from lab.	Lab Reports	25%
Specified on assignment.	Assignments, roughly 1 every 2 weeks.	15%
Set by UM administration. Exam period: December 9 - 20	Final Exam.	45%

Grading

Indicate your grading scale. A sample is given below that you can adjust to your course expectations.

Letter Grade	Percentage out of 100	Grade Point Range	Final Grade Point
A+	90-100	4.25-4.5	4.5
A	80-89	3.75-4.24	4.0

B+	75-79	3.25-3.74	3.5
B	70-74	2.75-3.24	3.0
C+	65-69	2.25-2.74	2.5
C	60-64	2.0-2.24	2.0
D	50-59	Less than 2.0	1.0
F	Less than 50		0

Lab Report and Assignment Style

Lab reports should use the format as outlined in the lab and in the lab manual.

Assignments must be neatly written in ink although it is permissible to draw diagrams in pencil. The assignments should not be written using red or green ink. The assignment should be formatted as a solution to each posed problem with a clear indication of the problem being solved. Intermediate work should be shown and the answer should be highlighted with a box or underlining.

Assignment Descriptions

Loss of 10% per day beyond deadline date.

The mid-term will cover the material from the ray tracing perspective. It will be held in class. The 3 hour final exam will include material from the full course and labs.

Assignment Grading Times

Lab report marks are normally expected to be returned one week after the report is submitted. However, for the first two lab reports the reports may be returned up to two weeks after the submission. Assignment marks are expected to be returned one week following the assignment due date. A sufficient percentage of the total mark in the course, including at least 3 lab reports, 2 assignments, and the midterm test, will be provided to the students before the Voluntary Withdrawal deadline. The final grades will be submitted to Aurora by the grade submission deadline and available on the Aurora website.

Assignment Extension and Late Submission Policy

Assignment due dates are strict. A penalty of 10% per day beyond the deadline date will be applied.

Information About Voluntary Withdrawal

Note that Voluntary Withdrawal has a number of impacts. The student must request permission to retake the course and there are limits to the number of repeated attempts. Access for VW students to the course may be limited if the course is full. A Voluntary

Withdrawal shall be recorded on the Student History and Official Transcript issued by the University.

Final grades for courses in which Students ceased attending, without an official VW, will be included on the Student History and Official Transcript issued by the University, and will be factored into the Student's Grade Point Average.

Policies

POLICY ON MISSED TESTS

No rewrites are given for the mid-term test. If you miss the mid-term test for a legitimate, documented reason, then the weight of the final exam will be increased to 65%. A **missed test for any other reason counts as zero!**

POLICY ON LABORATORY ATTENDANCE AND SUBMISSION OF LAB REPORTS

Attendance at **all** laboratory sessions is mandatory. Students should come to the lab ON TIME and listen to the introduction. Students coming more than 15 minutes late will not be allowed to do the experiment. Special circumstances might be considered.

Students will work in groups (usually pairs or groups of three) during the labs. All students must attend and complete individual full reports for Lab #1 and Lab #2. Thereafter, all students must still attend all experiments, however partners will alternate handing in a full report for the remaining 6 labs (i.e. one partner prepares hands in the odd numbered lab reports, and the other(s) hands in the even). In total, each student must hand in 5 lab full reports. In weeks where their partner prepares the full report, students must still hand in the acquired data, experimental section, and analysis sections for experiments.

In order to receive **any** credit for the laboratory component all students are required to attend and be graded on at least 7 out of the 8 experiments scheduled in the laboratory sessions and must hand in at least 4 of 5 full reports they have personally prepared. Credit for a completed lab requires that a lab report be submitted with the raw data.

Laboratory reports are generally due the next week and submitted in the appropriate lab slot. Late reports are accepted with a deduction of 10% per day. Beyond 1 week late the reports are no longer accepted. Hardcopies of the lab reports are required; however, these can be handwritten or prepared electronically. Consult the introductory section of the PHYS 2260 Laboratory Manual for more details.

PLAGIARISM AND CHEATING

(University of Manitoba Undergraduate Calendar, p. 27)

To plagiarize is to take ideas or words of another person and pass them off as one's own. In short, it is stealing something intangible rather than an object. Obviously it is not necessary to state the source of well-known or easily verifiable facts, but students are expected to acknowledge the sources of ideas and expressions they use in their written work, whether quoted directly or paraphrased. This applies to diagrams, statistical tables and the like, as well as to written material, and materials or information from Internet sources. To provide adequate documentation is not only an indication of academic honesty but also a courtesy which enables the reader to consult these sources with ease. Failure to do so constitutes plagiarism. It will also be considered plagiarism and/or cheating if a student submits a term paper written in whole or in part by someone other than him/herself, or copies the answer or answers of another student in any test, examination, or take-home assignment.

Plagiarism or any other form of cheating in examinations or term tests (e.g., crib notes) is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.

EXAMINATIONS: PERSONATIONS

(University of Manitoba Undergraduate Calendar, p. 26)

A student who arranges for another individual to undertake or write any nature of examination for and on his/her behalf, as well as the individual who undertakes or writes the examination, will be subject to discipline under the university's Student Discipline Bylaw, which could lead to suspension or expulsion from the university. In addition, the Canadian Criminal Code treats the personation of a candidate at a competitive or qualifying examination held at a university as an offence punishable by summary conviction. Section 362 of the Code provides:

Personation at Examination

362. Everyone who falsely, with intent to gain advantage for him/herself or some other person, personates a candidate at a competitive or qualifying examination held under the authority of law or in connection with a university, college or school or who knowingly avails him/herself of the results of such personation is guilty of an offence punishable on summary conviction. 1953-54, c.51, s.347.

Both the personator and the individual who avails him/herself of the personation could be found guilty. Summary conviction could result in a fine being levied or up to two years of imprisonment.

FACULTY OF SCIENCE STATEMENT ON ACADEMIC DISHONESTY

The Faculty of Science and The University of Manitoba regard acts of academic dishonesty in quizzes, tests, examinations, laboratory reports or assignments as serious offences and may assess a variety of penalties depending on the nature of the offence. Acts of academic dishonesty include, but are not limited to bringing unauthorized materials into a test or exam, copying from another individual, using answers provided by tutors, plagiarism, and examination personation.

Note: cell phones, pagers, PDAs, MP3 units or electronic translators are explicitly listed as unauthorized materials, and must not be present during tests or examinations.

Penalties that may apply, as provided for under the University of Manitoba's Student Discipline ByLaw, range from a grade of zero for the assignment or examination, failure in the course, to expulsion from the University. The Student Discipline ByLaw may be accessed at:

http://umanitoba.ca/admin/governance/media/Student_Discipline_Bylaw_-_2009_01_01.pdf

Suggested minimum penalties assessed by the Faculty of Science for acts of academic dishonesty are available on the Faculty of Science webpage:

http://umanitoba.ca/faculties/science/resources/Acad_Dishon_TABLE_RevCSS_AdminC_Jul2012_WEB.pdf

All Faculty members (and their teaching assistants) have been instructed to be vigilant and report all incidents of academic dishonesty to the Head of the Department.

Students Accessibility Services

Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services <http://umanitoba.ca/student/saa/accessibility/>

520 University Centre

204 474 7423

Student_accessibility@umanitoba.ca

SCHEDULE A

A Schedule A document is posted on the course website for PHYS 2260. This is a Policy and Resource Document with information on various University and Unit policies regarding academic integrity, student discipline, and respectful learning environment, for example, and on academic and student supports that are available, including a statement regarding mental health with referral information to the Student Counselling Centre and University Health Services.