

Moorpark College

Division of Physical Sciences & Career Education
Department of Physics, Astronomy, Engineering, and Computer Science

Physics M20C-31376 – Spring 2019

Instructor:

Erik D. Reese, PhD PS-233 805-378-1488 ereese@vcccd.edu

Lecture:

TR 10:00am-11:50am PS-202

Office hours:

M 12:00pm-2:00pm;
T 12:00pm-2:00pm;
W 12:00pm-1:00pm;
R 12:00pm-1:00pm and by appointment

Department Chair:

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Course description:

This is an introductory course in wave motion, optics, and the branch of physics known as modern physics, aimed primarily at scientists and engineers. We continue our discussion of wave motion and discuss geometric and physical optics, basic quantum mechanics, atomic structure, and relativity. I will find that this is a surprisingly subtle, complex, and intriguing subject. Upon mastering modern physics I will also acquire some of the tools needed for future studies in science and engineering, gain a new appreciation for the beauty of everyday phenomena, and substantially develop my reasoning skills.

Course Objectives:

Upon successful completion of the course I will:

- analyze basic physical situations involving reflection and refraction and use this analysis to predict the path of a light ray.
- apply concepts from special relativity to analyze physical situations, including time dilation, length contraction, and the Lorentz transformation; solve basic problems involving relativistic momentum and energy.
- apply basic concepts of quantum mechanics to analyze basic physical setups, including a particle in a box and simple atomic models.

- recognize and apply the equations that describe physical phenomena involving wave motion, optics, and modern physics.
- demonstrate ability to analyze and solve physics problems of greater than average difficulty.
- demonstrate ability to analyze, synthesize physics problems of reasonable complexity, and evaluate and judge the results of the solutions to these problems.

Course Learning Outcomes:

In addition to the above this course will also help me to develop the following skills and knowledge:

- Students completing PHYS M20C/M20CL will be able to discern between relevant and irrelevant evidence, formulate appropriate hypotheses, and distinguish between experiments to determine which one(s) leads to an appropriate conclusion.
- Students completing PHYS M20C will be able to analyze problems from Wave Mechanics, Optics, and Modern Physics and will be able to recognize and apply equations to solve problems.
- Cultivating problem solving and decision making skills to understand the scientific method and use the different parts to study the physical world.
- Developing critical creative and dialog thinking. Being able to recognize advanced concepts and the essence of problems involving Wave Mechanics, Optics, and Modern Physics.
- Cultivating problem solving skills and decision making capabilities. Taking advanced principles to solve problems involving Wave Mechanics, Optics, and Modern Physics.

My Textbook:

Physics for Scientists and Engineers with Modern Physics, Ninth Edition, by Raymond A. Serway & John W. Jewett, Jr. (ISBN 978-1-133-95405-7). This is the hardbound version with volumes 1 and 2 combined, which was probably the best option if I took the full Physics 20 series. If I have volume 1 already then it will save me money to buy just volume 2 (ISBN 987-1-333-95414-9). Prior editions are fine for reading, however, you must have the *Ninth Edition* for the assigned homework problems. Texts by Halliday & Resnick, Young & Freedman, etc. are all pretty similar to ours.

Prerequisites:

Physics M20B and Math M25C or equivalent. Proficiency with algebra, geometry, trigonometry, calculus, exponential notation, the metric system, and unit conversions is required; see Appendix B and the inner covers of our text.

My Class Web site:

Announcements, assignments, problem solutions, lecture slides, etc. will be made available on the *Canvas* course site available through [myVCCCD](#) or directly through [our local Canvas implementation](#). All announcements and possible supplemental material will be posted via the *Canvas* site.

I will turn on *email notifications* (and text notifications if I wish). To manage my notifications, I will log into *Canvas*, click on “Account” on the upper left, then notifications. I will select the check mark next to “Announcement” under “Course Activities” and any others that I wish to receive.

Announcements will be the main form of communication for this class. I will want to receive email so I know when there is new information without constantly logging in to check.

How I Will Earn My Grade:

To do well in this course I will complete all of the homework, quizzes, and exams. The breakdown for the grading is:

25%	quizzes			
40%	midterms	1. Thursday	February	7 th , 10am
		2. Thursday	March	14 th , 10am
		3. Thursday	May	2 nd , 10am
35%	final exam	Tuesday	May	14 th , 10:15am-12:15pm

I will earn my final grade based on the following percentage scale:

Percentage	Grade
90+	A
80-89	B
70-79	C
60-69	D
<60	F

Note: Exam dates are set in stone, please plan accordingly. *My lowest quiz and midterm score will each be dropped; this covers both poor performance as well as absence for any reason.*

Also Note: As a general policy grade information is not sent over email. I will visit Dr. Reese in his office for more detailed information on my grade or grade-related matters.

Classroom Participation:

Attendance and participation in lecture are mandatory to do well in this course. Helpful questions will be posed in class. Some of these will be elementary, and some will be designed to highlight common pitfalls and misunderstandings. Problem solving techniques will also be discussed. Asking questions in class is also strongly encouraged; *the class is better as a dialog.*

I understand that I may be dropped from the class after missing 4 class sessions.

Etiquette:

We have a large class, so I will be considerate of my fellow students. I will: arrive on time, will not leave early, will not read a newspaper, send text messages or email, or post on social media.

- **Note on cell phones:** If my cell phone rings during class then Dr. Reese will kindly answer it for me. If it sounds a text message alert then Dr. Reese will happily respond to the text message. I might consider turning my cell phone off. Please turn them off completely for exams as some make quite a bit of noise even on vibrate.
 - *If I leave a quiz or exam to use the restroom, I will leave my cell phone with Dr. Reese in the front of the class on my way out.*
- **Note on laptops:** Laptops may only be used in the classroom for taking notes. Other activities such as surfing the web, playing games, or other disruptive activities will not be tolerated.

- **Note on sound or video recording devices:** Recording devices of any kind are not permitted in the classroom unless the instructor receives verification from ACCESS for its use prior to the use of the device.
- **Note on faculty/staff offices:** Please treat offices as the owner's personal space. If the door is partially or completely closed, knock on the door and do not just enter the office. Even if the door is wide open, it is still polite to knock on the door jam or make yourself known before entering someone's office.
- **Note on email:** I will be courteous and respectful in all email exchanges. I will start email to faculty and staff with proper salutations such as "Dear Dr. Reese", will sign (write) my name at the end of each email, and include course & section information. I understand that email may be returned without answering my query if I do not follow proper email etiquette.

Quizzes and Homework:

Homework will be assigned weekly. Although the homework will not be graded, almost all students will find it necessary to complete a substantial fraction of the homework in order to master the material and do well on the exams and quizzes. Quizzes will be soon after we discuss homework in class and reflect the topics of the previous assignment.

Quizzes, Midterms, and Final Exam:

All quizzes and exams will begin and end on time. Arrive early and take alternate seating (in the rare cases when space allows). Backpacks, purses, briefcases, etc., should all be closed and placed under my seat so that the contents are not visible. Exams and quizzes will be closed-book, and closed-note. I will be allowed to use a calculator. I best remember to bring my calculator to class. Cell phones will *not* be allowed as calculators. An equation sheet will be provided. Only clarifying questions will be answered during a quiz or exam. I will write on the test itself, so I need not bring any other paper. Most exam problems will be similar (but not identical) to the harder homework problems – I should concentrate on *understanding* how to do those problems rather than on memorizing solutions to particular problems. It is possible that some questions will be more conceptual and qualitative, similar to some of the "Conceptual Questions" at the end of each chapter. Midterms will focus on material covered since the previous test but a cumulative understanding is required for good performance. The final will be cumulative. In general, quizzes are 15 minutes, midterms are 1 hour, and the final exam is 2 hours.

It is my responsibility to bring a scientific calculator to class and especially to quizzes and exams. Dr. Reese will NOT loan out calculators, though my classmates may if they so choose, before the quiz or exam begins. Cell phones may NOT be used as calculators during exams.

Note that smart devices and watches of any kind are prohibited for all quizzes and exams.

I understand that if I do not write my full name legibly and sign the statement of academic integrity with my full name then I will receive a zero on that quiz or exam.

Make-up Policy:

There will be no make-up quizzes or exams for any reason. In the event of “excused absences” the course grade will be based on the remaining quizzes and/or exams. If I fail to take a quiz or midterm exam and the absence is not excused, I will receive a zero for that quiz or exam. Documentation for the excuse will *always* be required and electronic documentation will not be accepted. I will notify the instructor *before* the quiz or exam of any absences, otherwise it will be considered an unexcused absence.

Academic Honesty:

Obviously, any form of copying or cheating on assignments, quizzes, or exams is strictly forbidden and may result in severe sanction or even expulsion. Academic dishonesty, in any form, is a violation of the Moorpark College Student Code of Conduct and, as such, is subject to investigation, charges of misconduct, and disciplinary consequences.

I understand that if I do not write my full name legibly and sign the statement of academic integrity with my full name then I will receive a zero on that quiz or exam.

Re-grade Policy:

Every effort will be taken to grade fairly; however, mistakes sometimes occur. If I believe a grading mistake has been made, I will write a polite note to Dr. Reese including a description of the mistake as I see it, staple it to my quiz/exam, and hand it to the instructor. Do not write on the original quiz/exam itself. Re-grade requests will not be accepted more than *one week* after the return of the graded work. Note that *all* problems on a submitted exam may be re-graded, not just the problem in question; it is possible that my grade could go down. If I believe I was penalized differently from another student who committed the same error, then I must include both quizzes/exams in my request. Note also that choice of policy for assigning partial credit is not a mistake subject to revision via re-grading.

Important Dates:

See the [Moorpark College academic calendar](#) for full details.

Jan	18	Last day to drop without fees
Jan	25	Last day to add this class
Jan	25	Last day to drop without a “W”
Feb	8	Last day to apply for pass/no pass
Apr	19	Last day to drop with a “W”, no drops after this date

Syllabus

Ch 15: Oscillatory Motion

Ch 16: Wave Motion

Ch 17: Sound Waves

Ch 18: Superposition and Standing Waves

Ch 35: The Nature of Light and the Principles of Ray Optics

Ch 36: Image Formation

Ch 37: Wave Optics

Ch 38: Diffraction Patterns and Polarization
Ch 39: Relativity
Ch 40: Introduction to Quantum Physics
Ch 41: Quantum Mechanics
Ch 42: Atomic Physics
Ch 43: Molecules and Solids
Ch 44: Nuclear Structure
Ch 45: Applications of Nuclear Physics
Ch 46: Particle Physics and Cosmology

We will cover approximately one chapter per week. The course is fast moving so be careful not to fall behind. I will come to office hours or arrange a time to meet with the instructor if I have questions. Sooner is better than later.

Weekly Class Structure:

In general, Tuesday will entail going over homework and introducing new material and Thursday will start with a quiz or exam and then new material will be introduced. After quizzes, solutions will be discussed immediately afterwards. During weeks with missed class, for example due to a holiday, there will be no discussion of homework and no quiz.

Study Tips for My Success:

- Come to lecture and keep up with the class. This sounds elementary, but it is really important. The material is progressive, in that each chapter depends on material presented in previous chapters. If I get behind, I *cannot* just skip a chapter and go on to the next; I have to understand the material at each stage before I can progress.
- Read the text slowly. A physics or math text cannot be read like a novel. I have to read each part carefully, and usually read each section more than once, maybe many times. I am strongly urged to read the relevant chapter *before* the material is discussed in class.
- Do the homework carefully—this is where the real learning takes place. If I cannot do all the problems, then I do not fully understand the concepts and I should work to identify and address the source of difficulty. Spend more time on homework problems than on reading. I solemnly swear to struggle with the homework before looking at the solutions. Doing my homework with the solutions next to me is not helpful.
- Compare my solutions against those posted on the course site. If I find an incorrect answer, I will try to understand why – was it a silly math mistake or a fundamental misunderstanding of the physics? If I identify the source of difficulty, then I can fix it. After a few days, when I have forgotten the posted solution, make a fresh attempt at all the problems that you missed.
- It is more useful to fully master *all* the assigned homework problems than to make half-attempts at additional unassigned problems from the textbook or elsewhere.
- Study groups can be extremely helpful. Do *not* use them as a way of dividing up the effort of doing the homework; that way I will lose the educational benefit of doing the homework in the first place. Do use them as a way of discussing the ideas presented in the course and general approaches to physics problems. Often, a good way to test if I understand something is to see if I can explain it to someone else.

- Old examinations are posted on the course site as a tool for test preparation. To make the best use of this resource, I should take the tests “honestly” under simulated test conditions without checking the answers (if posted) until you are done. Looking at the question, looking at the solution, and saying “yes, I could have done that” is not a useful approach. Note that the scope of each exam may vary from year to year. I will check to make sure I have access to the exam archives so, if need be, we can correct this quickly, well ahead of the exams.

Tutoring and Help:

Open access computer labs are available in the LLR building and in room 225 of the PS building (just down the hall from Dr. Reese’s office).

Students enrolled in this course are encouraged to use The Learning Center, The Math Center, and the Writing Center services to support their efforts in this class. The Learning Center, Math Center, and Writing Center, located in LLR 322, will provide tutorial services and supplemental instruction based on course goals. When using these services, students need to state their instructor’s name for tracking and reporting purposes. Students will also need to provide their student ID numbers when receiving tutorial services. For further information call The Learning Center 805-378-1556 or visit the [Learning Center website](#).

Students with disabilities, whether physical, learning, or psychological, who believe that they may be entitled to accommodations in their class, are encouraged to contact ACCESS as soon as possible to ensure that such accommodations are implemented in a timely fashion. Authorization from ACCESS is required before any accommodation can be made. The phone number for ACCESS is 805-378-1461 and they are located on the ground floor of the LMC Building. More information may be found on the [ACCESS website](#).

Tobacco Policy:

Moorpark College is 100% TOBACCO FREE – No smoking, vaping, chewing.

No tobacco is permitted on or in buildings, campus grounds or parking lots at all times.

Violators shall be subject to appropriate disciplinary action. AP 6800, BP 6810, AB 846.

More information about the no smoking policy and tobacco cessation may be found on the [related Health Center web pages](#).

Final Note:

Syllabus is subject to change due to unforeseen circumstances.