

# Physics 116, Spring 2022

March 24, 2022

Instructor: Milton From (he/his), CF377

Office phone: (360)650-6593, Email: [from@wwu.edu](mailto:from@wwu.edu)

Course Canvas site: <https://wwu.instructure.com/courses/1504261>

**Lectures:** M W F, 8:30-9:40 am in CF110, **Labs:** T 10am, 12, 2pm or 4pm in CF307

Both lectures and labs will be offered in-person. Lectures will be simultaneous with Zoom meetings and video recordings of the Zoom meetings will be posted online. Online versions of the labs will be available for those who cannot attend in-person labs for medical reasons. If you need to do a lab online, please make sure to contact your lab TA and Milton From at least a day in advance to get approval.

**Zoom links for the course are as follows:**

**Monday, Wednesday, and Friday Lectures in CF110, 8:30-9:40am**

<https://wwu-edu.zoom.us/j/93369143982>

**Tuesday Office hours: T10-12, 12-2, 2-4, 4-6 in CF307**

**(email or call to set up a specific time)**

<https://wwu-edu.zoom.us/j/97807261013>

If Tuesday office hours don't work for you, please email/phone to set up an appointment on other days.

## **Student Learning Outcomes**

Upon completion of this course, students will:

- (i) Have demonstrated mastery of the core concepts related to wave behavior as it relates to sound, light, and electromagnetic waves in general. They will also have demonstrated mastery of several basic core concepts of Special Relativity, Atomic and Nuclear Physics.
- (ii) Have demonstrated understanding of quantitative reasoning and scientific inquiry.
- (iii) Have demonstrated an ability to test hypotheses using lab equipment and interpret data from experiments.
- (iv) Have demonstrated an ability to solve problems, both independently and in groups.

## **Course Reference Material**

A possible text for the course is *College Physics* by Knight, Jones, and Field (4th edition). Alternatively you may use the same text that you used for Physics 114/115 (For example *College Physics* by Giordano (2nd edition) or *College Physics* by Knight et al. (3<sup>rd</sup> edition)). We will cover most of chapters 15-16, 17-19, 25, 27-30 in Knight and the equivalent material in Giordano. I will make it clear what material you are responsible for as we go along.

The Canvas site for our course is <https://wwu.instructure.com/courses/1504261>. You will need to consult this site regularly. It will contain links to assignment questions, solutions for assignments and tests, lists of material you will be responsible for on tests, photographs/videos of some of the classroom demonstrations, etc.

## Tutoring Center

WWU's Tutoring Center will provide online tutoring support for this course. You can access a tutor Mondays-Thursdays 10am-9pm, Fridays 10am-5pm, and Sundays 5pm-9pm from the Tutoring Center website: <https://library.wvu.edu/use/tutoring-center/welcome>.

## Approximate Schedule (as of March, 2022)

Check back regularly. This will be updated continually throughout the quarter.

Detailed information on what you are responsible for in each chapter can be found [here](#). (K3 and K4 refer to 3<sup>rd</sup> and 4<sup>th</sup> editions of the text by Knight, G2 refers to the 2<sup>nd</sup> edition of the text by Giordano.)

Wk	Date	Topics	Textbook Chapters			Tests
			K3	K4	G2	
1	Mar 29-Apr 1	Waves and Sound	15	15	12	
2	Apr 4-8	Superposition and Standing Waves	15, 16	15, 16	12, 13	
3	Apr 11-15	Electromagnetic Waves	16, 25	16, 25	13, 23	
4	Apr 18-23	Electromagnetic Waves	25	25	23	Wed, Apr 20
5	Apr 25-29	Geometrical (ray) Optics	18	18	24	
6	May 2-6	Wave Optics	17, 18	17,18	24, 25	
7	May 9-13	Optical Instruments	19	19	25, 26	
8	May 16-20	Relativity	27	27	27	Wed, May 18
9	May 23-27	Quantum Physics	28	28	28	
10	Jun 1-3 (M is a holiday)	Atomic and Molecules, Nuclear Physics	28,29 30	28, 29 30	28, 29 30	
<b>Finals week</b>	<b>Wednesday, June 8</b>					<b>Final exam 10:30- 12:30 pm</b>

## Lecture demonstrations

Please take notes on any demonstrations presented in the lectures and make sure to ask questions if you don't understand something. The Canvas webpage has links to photos and/or brief descriptions of the demos. Some quiz and/or test questions will be based on demonstrations.

## Homework

I will assign 10-20 homework problems per week. These problems will **not** be handed in or graded. However, it is crucial that you do them since many of the test and quiz questions will be similar to the assigned homework problems.

Weekly assignments and solutions will be provided on Canvas. Please complete the assignments and **check, in detail, your solutions against my solutions!** Please contact me if you do not understand something in my solutions. A good way to prepare for tests is to simply be sure that you understand, and can do all assignment problems correctly, without having to look at my solutions.

In addition, you may want to try additional textbook problems from the back of each chapter. Numerical answers to all odd problems are given in the text. Please feel free to contact me if you have trouble with any of the problems. Before coming to see me though, think carefully about what the problem is asking you to do and work on it for a few minutes. I would prefer if you could explain the problem and/or draw a diagram

without reference to the text when you see me in office hours.

A final word about the homework: Physics is something that takes time to sink in. The best way to succeed in the course is to work on a couple of problems every single day. And **do the ones you have difficulty with several times**. Trying to do 15 problems on the night before a quiz will probably not work very well!

### Labs

The lab component of the course is intended to illustrate general procedures in laboratory physics and data analysis, as well as to give you hands-on experience with some of the material dealt with in the lectures. Guide sheets for the labs, in docx and pdf format, are available on Canvas. These guide sheets may contain tables that need to be filled in, or spaces for graphs, or places where text answers are needed. In addition, you may need to print out plots or screenshots from the lab computers. Your completed guidesheets and printouts should then be turned in to your TA, either at the end of the lab period, or before a deadline specified by your TA.

### Tentative Schedule of Lab Topics

Week	Date (Tuesdays)	Lab
2	Apr 5	0 Brief orientation to the lab
3	Apr 12	1 Speed of Waves
4	Apr 19	2 Physics of Sound and Musical instruments
5	Apr 26	3 Light as a wave
6	May 3	4 Refraction of light
7	May 10	5 Lenses: properties and uses
8	May 17	6 Spectroscopy
9	May 24	7 Interference and Diffraction
10	May 31	8 Nuclear Physics

In-person labs occur on Tuesdays in four time slots: 10-12, 12-2, 2-4, and 4-6, and you have been assigned to one of these. If you have a one-time schedule conflict, and need to change your lab time, this may be possible. However, please email the TAs in question well in advance to arrange such a change. Even if you do the lab with a different TA, please submit your lab report to your regular TA. The laboratory grades from each TA will be curved to ensure that average grades of all TAs are consistent.

If you cannot attend a lab for medical reasons, please contact Milton From to arrange to do an online version of the lab.

As part of our effort to continually improve our labs we will be administering a web-based pre/post course survey designed by the University of Colorado. As an incentive we are allotting 5% of your course grade to participation in this survey. There are no right or wrong answers to the questions in this survey. You will receive the full 5% as long as you take the pre and post course surveys. You will receive a link to the pre-course survey via email soon after your first 116 class meeting. The link will also be posted on Canvas. **This link will only remain active for a few days so please take the survey as soon as possible.** The survey has a post-course component as well, and a link for this will be sent to you near the end of the course.

### Tests and quizzes

There will be two in-class tests, weekly quizzes (generally on Mondays), and an in-class final exam. Quizzes will be multiple choice. Questions on the tests and exam will be a mix of quantitative, qualitative, long answer, and multiple-choice questions. Only the final exam is cumulative. Tests will take a full class period (70 minutes) minutes and the exam will be allotted two hours. To help you during the tests you may use an 8.5" x 11" summary sheet of equations. This sheet must be your own compilation of hand-written

equations, and it must be different from the sheets of other students in the class. This summary sheet must be attached to the test when you turn it in, and provided it is accurate, unique, and comprehensive, it will contribute as an automatic 10% toward your grade. For the exam, you will be allowed two 8.5” x 11” sheets that also need to be turned in with the exam.

Quizzes will be administered on Canvas and you will be given 10 minutes to do them. They will be based on material covered in the previous couple of lectures and/or be **closely related to the previous week’s assignment problems.**

Calculators may be used for quizzes, tests, and the exam.

**Missed Tests, Quizzes, and Laboratories**

Tests, quizzes, and lab reports that are not done before their deadlines will be assigned a grade of zero unless rescheduled or excused in accordance with general WWU policies. If you have extenuating circumstances, please contact Milton From, **before the relevant deadline** to discuss options.

Please read the document <https://syllabi.wvu.edu/> for information on general WWU policies, specifics related to COVID19, as well as information on general WWU topics such as Academic Honesty, Accommodations, Ethical Computing Resources Conduct, Equal Opportunity, Finals, and the Student Conduct Code.

**Grades:**

Quizzes	pre/post-lab surveys	labs	2 midterm tests	Final exam
15%	5%	20%	20% each	20%

<b>Percentage</b>	90-100	85-89	80-84	77-79	73-76	70-72	67-69	63-66	60-62	57-59	53-56
<b>Grade</b>	A	A-	B+	B	B-	C+	C	C-	D+	D	D-