PHY 241: University Physics III

Course and Faculty Information

Course Description: This course provides an introduction to thermodynamics, kinetic theory, physical and wave optics, relativity, photons, matter waves, atomic physics. This course builds on knowledge of mechanics and electric and magnetic fields. It presents principles of physics and topics that are important for a modern education in a science/engineering curriculum.

Credits: 3

Prerequisites:

- PHY 131
- MAT 266 or MAT 271 with C or better; PHY 121 with C or better; Pre/Co-requisite: MAT 267 or MAT 272 with C or better if completed.
- Students are required to have passed the previous course, PHY-131: University Physics II. For PHY 131 and PHY 241, a strong background in calculus is necessary as well as familiarity with vectors and trigonometry.

Instructor: Professor Robert J. Nemanich

Contact Info:

- Office: PSB-353, (Bateman Physical Science Complex wing B, floor 3, room 353)
- Phone: 480-965-2240
- Email address: Robert.Nemanich@asu.edu
- Office Hours: 9:00-10:00 am Tues. (or to be arranged via email)

Course Learning Outcomes

At the completion of this course, students will be able to:

- Understand how work, heat and energy is transformed into each other and transferred.
- Understand macroscopic thermodynamic properties of solids, liquids and gases in terms of the microscopic motion of atoms and molecules.
- Understand the principle of superposition, and how it leads to interference, diffraction and standing waves in string waves, sound waves and light waves.
- Understand the principles of relativity: the speed of light is constant and all the laws of physics are the same in all inertial frames of reference.

- Apply the principles of relativity to solve problems of time dilation and length contraction.
- Understand rest energy, kinetic energy and the conversion of mass and energy.
- Understand that photons have quantized energy and are emitted and adsorbed in an all-or-nothing basis.
- Understand quantized levels in atoms and light emission and absorption.
- Understand the wave nature of matter and the uncertainty principle.
- Understand the wave function as related to probability density fror quantum systems.
- Apply Schrodinger's equation to understand the wave function for some one dimensional systems.

Textbooks/Materials

Title: Physics for Scientists and Engineers **with Modern Physics**
Author: Randall D. Knight
Publisher: Pearson, 3rd Edition

Homework, and Practice Tests: are online with MasteringPhysics.

You have two options:

- Buy an etext copy of the textbook together with MasteringPhysics access. See Purchase Option 1 below.
- Buy MasteringPhysics access only and skip the textbook, or buy a used version elsewhere, or use another textbook. See Purchase Option 2 below.

You can pay with a credit card or via PayPal. If you're waiting for financial aid and can't pay immediately, you can still access the full set of features in your instructor's online course without payment for 17 days. The temporary access option enables you to start your coursework and avoid missing deadlines set by your instructor.

Below is a description of the options. In all cases, if during the registration process you are asked for a Course ID, you won't need one.

Purchase Option 1

The estimated cost is $110 for 2-year access. To select this option, do the following:

1. Click on the MasteringPhysics link on the left Course Menu.
2. Follow the directions there, and when prompted, select the "I need to buy access" option. Then select the Knight textbook and "OK" when prompted whether you want the e-text bundle.
3. When your registration is complete, the You are Done page is displayed and you get a confirmation email. Click Go to Your Course to enter the course immediately.
4. Aftter this initial setup, you must always access your MasteringPhysics account from the MasteringPhysics link on the left Course Menu.

Purchase Option 2

The estimated cost is $66 for 2-year access. To select this option, do the following:

1. Click on the MasteringPhysics link on the left Course Menu.
2. Follow the directions there, and when prompted, select the "I need to buy access" option. Then select the Knight textbook and "I would like to buy it without the e-text option" when prompted whether you want to the e-text bundle.
3. When your registration is complete, the You are Done page is displayed and you get a confirmation email. Click Go to Your Course to enter the course immediately.
4. Aftter this initial setup, you must always access your MasteringPhysics account from the MasteringPhysics link on the left Course Menu.

Used book, rented book, another textbook, no textbook

If you selected Purchase Option 2, you still have several options regarding textbook. Some thoughts about these options:

1. You are not required to have a textbook. You could in principle "survive" by watching the Lectures and reading the Lecture Handouts. Many homework problems are taken from the end-of-chapter problems in the Knight textbook, but these problems will be available to you via MasteringPhysics without the need of having the textbook by you.
2. Nevertheless, the instructor recommends that you do acquire a copy of the textbook, because you may find that the explanations there complement the lecture, and many students find it easier to understand a concept by reading it from a textbook instead of watching a lecture.

A scientific calculator is required for homework and all tests.

Assignments are handled through access to the homework system MasteringPhysics. Students must have an account with this system from the very first day of classes.

Course Access

Your ASU courses can be accessed by both my.asu.edu and asu.instructure.com; bookmark both in the event that one site is down.

Computer Requirements

This is a fully online course; therefore, it requires a computer with internet access and the following technologies:

- Web browsers (Chrome, Mozilla Firefox, or Safari)

- Adobe Acrobat Reader (free)
- Adobe Flash Player (free)
- Webcam, microphone, headset/earbuds, and speaker
- Microsoft Office (Microsoft 365 is free for all currently-enrolled ASU students)
- Reliable broadband internet connection (DSL or cable) to stream videos.

Note: A smartphone, iPad, Chromebook, etc. will not be sufficient for completing your work in ASU Online courses. While you will be able to access course content with mobile devices, you must use a computer for all assignments, quizzes, and virtual labs.

Technical Specifications

- PC Users: A well-working computer running Windows XP or higher with 1024 MB of RAM or higher.
- Mac Users: A well-working computer running Mac OS X or higher.
- A web cam with 640x480 video pixel resolution (web cams built into laptops or monitors are acceptable).
- Headphones or working speakers connected to the computer.
- A microphone connected to the computer (your web cam or laptop may already have one built into it).
- A reliable high speed internet connection (minimum 768 Kbps/384 Kbps Download/Upload).
- A web browser with Adobe Flash Player installed.

Student Success

To be successful:

- check the course daily
- read announcements
- read and respond to course email messages as needed
- complete assignments by the due dates specified
- communicate regularly with your instructor and peers
- create a study and/or assignment schedule to stay on track
- access ASU Online Student Resources

Grading

Your grade will be determined based on the following grading schema:

Grade	Percentage
A+	97.0 – 100%
A	92.0 – 96.99%
A-	87.0 – 91.99%
B+	82.0 – 86.99%
B	77.0 - 81.99%
B-	72.0 - 76.99%
C+	68.0 - 71.99%
C	63.0 - 67.99%
D	55.0 - 62.99%

Grading Procedure

The final grade will be determined from the homework assignments (35%), tests (35%), and the final exam (30%).

- **Homework (35%)**: There will be a total of thirteen (13) assignments, one per each chapter, which will all count towards your final grade. Scores from the Mastering Tutorial and practice tests will be added to homework points without increasing the total possible. The maximum score including extra credit can be no more the 100%.
- Late homework within 24 hrs of the submission deadline will receive a 25% deduction. Late homework submitted more than 24 hrs after the submission deadline and before the final exam day will receive a 50% deduction.
- **Tests (35%)**: There will be three mid-term tests (through Canvas using RPNow). A computer with internet access, a webcam/video monitor and speaker/microphone is required. All tests/exams are Open Course Text/Open Student Notes (other books or prepared notes are not allowed).
- **Final Exam (30%)** will be comprehensive and will be available (through Canvas using RPNow). A computer with internet access, a webcam/video monitor and speaker/microphone is required. .
- **Course Grade:** Total Percent = (0.3 x Final Exam) + (0.35 x Test Average) + (0.35 x Homework percent) (note: 1 tests are corrected to 100 pts maximum before averaging, homework percent includes extra points but is limited to no more than 100%).

Submitting Assignments

All assignments, unless otherwise announced, MUST be submitted to the designated area of Canvas. Do not submit an assignment via email.

Assignment due dates follow Arizona Standard time. Click the following link to access the Time Converter to ensure you account for the difference in Time Zones. Note: Arizona does not observe daylight savings time.

Grading Procedure

Grades reflect your performance on assignments and adherence to deadlines. Grades on assignments will be available within 72 hours of the due date in the Gradebook.

Late or Missed Assignments

Notify the instructor BEFORE an assignment is due if an urgent situation arises and you are unable to submit the assignment on time.

Follow the appropriate University policies to request an accommodation for religious practices or to accommodate a missed assignment due to University-sanctioned activities.

Late or Missed Assignments

Activities used for instruction include video lectures, textbook readings, and online discussions. Assessment is based on homework assignments, tests, and a final exam.

Tests, Requirements, and Procedures

All tests and the final exam will be administered through **Canvas**, using RPNow. See the RPNow tab.

Technical Specifications

- PC Users: A well-working computer running Windows XP or higher with 1024 MB of RAM or higher.
- Mac Users: A well-working computer running Mac OS X or higher.
- A web cam with 640x480 video pixel resolution (web cams built into laptops or monitors are acceptable).
- Headphones or working speakers connected to the computer.
- A microphone connected to the computer (your web cam or laptop may already have one built into it).
- A reliable high speed internet connection (minimum 768 Kbps/384 Kbps Download/Upload).

Exam FAQs

Review the RPNow process.

Plan ahead for your test session.

- Make sure you have a quiet, private location in which to take the test. A public computer lab will not work for this, as the audio conversation you will have with the proctor will disturb others.
- The area and room around your computer will be scanned using a video camera prior to the beginning of the test, so all non-authorized materials should be put away and the area should be clutter-free.
- No breaks are allowed during the testing time. Use the restroom before the test begins.
- No cell phones or other devices are allowed in the testing area.
- No other people are allowed in the testing area while the test is being taken.
- No internet usage other than test and eText.
- Any unauthorized notes or other attempts to cheat will abort the test session and be reported to me.

You may use the following during your proctored exam:

- Calculator
- Pencils/pen
- Open text -- the text of this course whether in eText or hard copy
- Notes that you have prepared
- Blank sheets of paper

Course Topics & Schedule

Activities used for instruction include video lectures, textbook readings, and online discussions. Assessment is based on homework assignments, tests, and a final exam.

	Date	Day	Readings/Assignments/Tests
Week 1			(8/22 - 8/23)
	22-Aug	Thurs	Course starts
			Ch 16: A Macroscopic Description of Matter
	23-Aug	Fri	Mastering Tutorial
Week 2			(8/26 - 8/30)
	26-Aug	Mon	Ch 16 Homework
			Ch 17: Work, Heat, and the First Law of Thermodynamics
	29-Aug	Thurs	Ch 17 Homework
			Ch 18: The Micro/Macro Connection

Week 3			(9/02 - 9/06)
	03-Sept	Tues	Ch 18 Homework
			Ch 19: Heat Engines and Refrigerators
	05-Sept	Thurs	Ch 19 Homework
	06/07Sep	Fri-Sat	Practice Test 1
	06/07Sep	Fri-Sat	TEST 1 (1:00 am Fri to 11:00 pm Sat AZ time - MST)
Week 4			(9/09 - 9/13)
			Ch 20: Traveling Waves
	10-Sep	Tues	Ch 20 Homework
			Ch 21: Superposition
	12-Sep	Thurs	Ch 21 Homework
			Ch 22: Wave Optics
Week 5			(9/16 - 9/20)
	16-Sep	Mon	Ch 22 Homework
			Ch 23: Ray Optics
	19-Sep	Thurs	Ch 23 Homework
	20/21Sep	Fri-Sat	Practice Test 2
	20/21Sep	Fri-Sat	TEST 2 (1:00 am Fri to 11:00 pm Sat AZ time - MST)
Week 6			(9/23 - 9/27)
			Ch 36: Relativity
	24-Sep	Tues	Ch 36 Homework
			Ch 37: The Foundations of Modern Physics
	26-Sep	Thurs	Ch 37 Homework
			Ch 38: Quantization
Week 7			(9/30 - 10/04)
	30-Sep	Mon	Ch 38 Homework
			Ch 39: Wave Functions and Uncertainty
	03-Oct	Thurs	Ch 39 Homework
	04/05Oct	Fri-Sat	Practice Test 3
	04/05Oct	Fri-Sat	TEST 3 (1:00 am Fri to 11:00 pm Sat AZ time - MST)
			Ch 40: One-Dimensional Quantum Mechanics
Week 7			(10/07 - 10/11)
	08-Oct	Tues	Ch 40 Homework
	11/12Oct	Fri-Sat	Final Exam (1:00 am Fri to 11:00 pm Sat AZ time - MST)

Communicating With the Instructor

Community Forum

This course uses a discussion topic called "Community Forum" for general questions and comments about the course. Prior to posting a question or comment, check the syllabus, announcements, and existing posts to ensure it's not redundant. You are encouraged to respond to the questions of your classmates.

Email questions of a personal nature to your instructor. You can expect a response within 72 hr.

Chat

The Chat tool in Canvas allows students and teachers to interact in real time. Use Chat only for informal course-related conversations unless your instructor informs you otherwise. Chat is not ideal for questions about assignments; instructors are not required to monitor it and conversations may be buried or lost.

Email

ASU email is an official means of communication among students, faculty, and staff. Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their ASU-assigned email regularly.

All instructor correspondence will be sent to your ASU email account.

ASU Online Course Policies

View the ASU Online Course Policies

Accessibility Statements

View the ASU Online Student Accessibility page to review accessibility statements for common tools and resources used in ASU Online courses.

If any other tools are used in this course, links to the accessibility statements will be listed below this sentence.

Syllabus Disclaimer

The syllabus is a statement of intent and serves as an implicit agreement between the instructor and the student. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. Remember to check your ASU email and the course site often.