

## PHYS 274 - General Physics III

(Modern Physics w/ calculus)

Department of Physics & Astronomy

University of Hawaii

Instructor: Prof. Tom Browder

Class Meets TuTh 13:30-14:45, HIG 110

(Fall 2019 edition)

( <http://www.phys.hawaii.edu/~teb/phys274/phys274.html> )

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**Text:** University Physics Volume 2 (Chaps. 35-44) & Volume 3, 15th Edition, by Young and Freedman, Pearson

**\*\*\* an iclicker or a smart phone with the Iclicker REEF app is required, please bring your iclicker (or device) to every class meeting \*\*\***

**We now use Laulima to register devices (cell phones) or clickers, Clicker software is iClicker Cloud 5.0**

**\*\*\* Mastering Physics is required for the homework. There will also be written homework to hand-in \*\*\***

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- **Homework Assignments** (check frequently for updates, Mastering Physics course code: browder33353 DSCKUO-THUNK-VETCH-BLOBS-QUASH-BODES (Fall 2019) )
- **Daily quiz (except on midterm and exam days):** A quiz (closed book) will be given at the beginning of each class. It usually consists of 2 short questions on materials covered in the previous lecture and 2 short questions on the materials to be covered that day. ***You will need your iclicker/or device for the quiz. You have one to two minutes to answer each question.***

### Grading

Grading is based on an absolute scale.

Total (100%) = quizzes/iclicker questions (15%) + HW (25%) + (Midterm 1+ Midterm 2 + Final=(60%)).

The combined % for Midterm 1+ Midterm 2 + Final=60%; the highest score=25%, middle score=20%, lowest score=15%.

Approximate (very rough) values:

90-100 (A), 71-89 (B) 58-70 (C) 41-57 (D) <40 (F)

## Tests

There will be two midterms and a final.

The midterms, will be a combination of quantitative (3) and conceptual (1).

For the two midterms, you can bring a standard size notecard with formulae.

\*\*\* Midterm I, Thursday Sept 26 (TBC)

(Problem 1: Interference; Problem 2: Diffraction; Problem 3: Special Relativity (remember to study relativistic energy and momentum); Problem 4: Short answer conceptual questions)

\*\*\* Midterm II, Thursday October 31

(Problem 1: Photons; Problem 2: Particles behaving like waves; Problem 3: Quantum Mechanics; Problem 4: Short answer/ conceptual questions)

Remember to study hydrogen-like atoms in the Bohr model, the QM particle in a box, tunneling and the Heisenberg uncertainty principle.

For the final exam (Thursday Dec 19th) you can bring a single sheet of paper with formulae.

The final exam will have 8 problems

(6 problems requiring calculation and 2 short answer/conceptual questions (including chapter 44)).

The last two problems will include some questions about energy and momentum in special relativity and particle physics.

Problem 1: Interference/Diffraction

Problem 2: Heisenberg Uncertainty Principle (Particles and/or Waves)

Problem 3: QM I: Wave Functions

Problem 4: QM II: Atomic Structure

Problem 5: Molecules/Solid State

Problem 6: Nuclear Physics

## Tutoring

[Click here](#) for updated info on tutoring at the learning emporium.

## Simulations:

[Cartoons](#) that illustrate coherence length in the context of thin film interference

The java applets used for lecture demonstrations of interference, diffraction, and atomic orbitals

can be found on the web site [falstad.com](http://falstad.com)  
[Segre Chart](#) of atomic nuclei.

## Quizzes

There were 34 in-class quizzes in the Fall 2016 edition of PHYS274. There will be a comparable number in the Fall 2019 edition. However, these are fully integrated into the lectures.

## Syllabus for Physics 274 (Fall 2019 version, under construction)

- Tuesday August 27: Interference, Chapter 35

Read Chapter 35

Homework I: Mastering Physics (MP) Assignment I (MP35.2, MP35.8, MP 35.20) and Hand in (HI) 35.32, 35.44

*(Homework I is due Tuesday Sept 3rd)*

- Thursday August 29: Interference, Chapter 35

- Tuesday September 3: Diffraction, Chapter 36

*Homework I due*

Homework II: MP36.4, 36.9, 36.14, 36.44 and Hand in 36.20, 36.22 (due Tuesday Sept 10th)

- Thursday September 5: Diffraction, Chapter 36

- Tuesday September 10: Finish Diffraction, Special Relativity Chapter 37

Homework III: MP36.34, MP36.58, MP37.5, MP37.6, M37.13, MP37.20 and Hand in 37.11, 37.51 (due Tuesday Sept 17th) *Homework II due*

- Thursday September 12: Relativity, Chapter 37

- Tuesday September 17: Relativity, Chapter 37

*Homework III due*

Homework IV: MP37.23, MP37.26, MP37.30, MP37.36, MP37.38, MP37.50 and HI 37.44, HI 37.52

- Thursday September 19: Special Relativity, Chapter 37

- Tuesday September 24: Special Relativity, General Relativity

*Homework IV due*

- Thursday September 26: Review for Midterm I

- Tuesday October 1: Midterm I
  
- Thursday October 3: Chapter 38, Waves as particles, Compton Scattering  
Homework V: MP38.4, MP38.8, MP38.10, MP38.14, MP38.18, MP38.20, MP38.21 and Hand-in 38.31, 38.39, 38.40 (needs a hint),  
due October 15th
  
- Tuesday October 8: Chapter 39, Waves as Particles, Heisenberg Uncertainty Principle
  
- Thursday October 10: Chapter 39, Particles as Waves
  
- Tuesday October 15: Chapter 40, Particles as Waves  
*Homework V due* Homework VI: MP39.2, MP39.14, MP39.18, MP39.25, MP39.27, MP39.32, MP39.44 and MP39.72 and hand-in 39.26, 39.55, 39.64  
Homework VI due October 22nd
  
- Thursday October 17: Chapter 40, Quantum Mechanics I
  
- Tuesday October 22: Chapter 40, Quantum Mechanics I  
*Homework VI due*  
Homework VII: MP40.10, MP40.20, MP40.24, MP40.28, MP40.36, MP 40.38, and Hand-in 40.43 and 40.44
  
- Thursday October 24: Chapter 40, Quantum Mechanics I
  
- Tuesday October 29: Chapter 41, Quantum Mechanics II  
*Homework VII due*  
Homework VIII: MP41.2, MP41.10, MP41.20, MP41.22, MP41.26, MP41.30, MP41.30, MP41.38 and Hand-in 41.16, 41.56
  
- Thursday October 31: Review for Midterm II
  
- Tuesday November 5: Midterm II
  
- Thursday November 7: Chapter 41, Quantum Mechanics II
  
- Tuesday November 12: Chapter 41, Quantum Mechanics II  
Homework VIII due  
Homework IX: TBA
  
- Thursday November 14: Chapter 42, Molecules and Condensed Matter

- Tuesday November 19: Chapter 42, Molecules and Condensed Matter
- Thursday November 21: Chapter 43, Nuclear Physics
- Tuesday November 26: Chapter 43, Nuclear Physics
- Thursday November 26: Thanksgiving Break
- Tuesday December 3: Chapter 43, Nuclear Physics
- Thursday December 5: Chapter 44, Particle Physics
- Tuesday December 10: Chapter 44, Particle Physics
- Thursday December 12: Review
- Final Exam: Thursday Dec 19th, 12:00-2pm