

PHYS 274 - General Physics III

(Modern Physics w/ calculus)

Department of Physics & Astronomy

University of Hawai'i

Instructor: Prof. Tom Browder

Class Meets TuTh 13:30-14:45 in Bilger 150

(Fall 2023 edition)

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

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Text: University Physics (Chapters 35-44), 15th Edition, by Young and Freedman, Published by Pearson

***** A smart phone or smart device with the Iclicker REEF app is required, please bring your cell phone (or device) to every class meeting *****

We now use IClicker Cloud software.

Join Code: <https://join.iclicker.com/LBXC>

***** Mastering Physics is required for the homework. The textbook code is available through VitalSource.**

However, the textbook and electronic problems (Young & Freedman, 15th edition) are available through the Pearson website.

Mastering Physics course code: browder74236 (Fall 2023)

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 for cutoffs on weighted averages in 2022:

90-100 (A), 71-89 (B) 58-70 (C) 41-57 (D) <40 (F) Grade cutoffs in fall 2023 were

higher.

Tests:

There will be two midterms and a final.

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

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

****** Midterm I, October 5***

(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, 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 December 14, 12-2 pm) 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 (including tunneling)

Problem 4: QM II: Atomic Structure

Problem 5: Molecules/Solid State

Problem 6: Nuclear Physics

Tutoring information (TBA)

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
[Segre Chart](#) of atomic nuclei.

Syllabus for Physics 274 (Fall 2023 version, preliminary and under construction)

- ***Tuesday August 22: Interference, Chapter 35***
- ***Thursday August 24: Interference, Chapter 35***
- ***Tuesday August 29: Diffraction, Chapter 36***
- ***Thursday August 31: Diffraction, Chapter 36***
- ***Tuesday September 5: Finish Diffraction, Special Relativity Chapter 37***
- ***Thursday September 7: Relativity, Chapter 37***
- ***Tuesday September 12: Relativity, Chapter 37***
- ***Thursday September 14: Special Relativity, Chapter 37***
- ***Tuesday September 19: Special Relativity, General Relativity, Chapter 37***
- ***Tuesday September 21: Chapter 38, Waves as particles***
- ***Tuesday September 26: Chapter 38, Waves as particles, Compton Scattering***
- ***Thursday September 28: Chapter 39, Waves as Particles, Heisenberg Uncertainty Principle***
- ***Tuesday October 3: Chapter 39, Review for Midterm I***
- ***Thursday October 5: Midterm I***

- *Tuesday October 10: Particles as Waves*
- *Thursday October 12: Chapter 40, Particles as Waves*
- *Tuesday October 17: Chapter 40, Quantum Mechanics I*
- *Thursday October 19: Chapter 40, Quantum Mechanics I*
- *Tuesday October 24: Chapter 40, Quantum Mechanics II*

- *Thursday October 26: Review for Midterm II*
- *Tuesday October 31: Midterm II*

- *Thursday November 2: Chapter 41, Quantum Mechanics II, Angular Momentum and Spin*
- *Tuesday November 7: Chapter 41, Quantum Mechanics II, Atomic Structure*
- *Thursday November 9: Chapter 41, Quantum Mechanics II, Atomic Structure*
- *Tuesday November 14: Chapter 41, Quantum Mechanics II, Atomic Structure*
- *Thursday November 16: Chapter 42, Molecules and Condensed Matter Atomic Structure*

- *Tuesday November 21: Chapter 42, Molecules and Condensed Matter*

- *Thursday November 23: Thanksgiving Break*

- *Tuesday November 28: Chapter 43, Molecules and Condensed Matter, Nuclear Physics*

- *Thursday November 30: Chapter 43, Nuclear Physics*

- *Tuesday December 5: Chapter 44, Particle Physics and Cosmology*

- *Thursday December 7: Review*

- *Final Exam: Thursday, December 14, 12-2pm*