

## PHYS 274 - General Physics III

(Modern Physics w/ calculus)

Department of Physics & Astronomy

University of Hawai'i

Instructor: Prof. Tom Browder

Class Meets TuTh 3:00-4:15 in PSB217

(Fall 2025 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/VRVJ>**

**\*\*\* Mastering Physics is required for the homework. The textbook (Young and Freedman) is available through VitalSource on Lamaku**

### **Grading:**

**Grading is based on an absolute scale. Approximate weights below.**

**Total (100%) = quizzes/iclicker questions (15%) + HW (20%) + (Midterm 1+ Midterm 2 + Final)=(65%).**

**The combined % for Midterm 1+ Midterm 2 + Final =65% ;**

**the highest score=35%, middle\_score\_1=20%, lowest score=10%.**

**Approximate (very rough) values for cutoffs on weighted averages in:**

**90-100 (A), 80-89 (B) 70-79 (C) 55-69 (D) <54 (F)**

### **Tests:**

**There will be two midterms and a final.**

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

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

**\*\*\* Midterm I, Thursday Oct 9**

*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 November 20**

*Problem 1: Heisenberg Uncertainty Principle (either photons or particles)*

*Problem 2: Quantum Mechanics 1-D solutions*

*Problem 3: Quantum Mechanics tunneling*

*Problem 4: (Short answer/ conceptual questions cover material up to Chapter 41)*

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

*For the final exam (Tuesday Dec 16th of Finals Week) 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](http://falstad.com)  
[Segre Chart](#) of atomic nuclei.

## ***Syllabus for Physics 274 (Fall 2025 version, under construction)***

- ***Tuesday August 26: Interference, Chapter 35***
- ***Thursday August 28: Interference, Chapter 35***
- ***Tuesday September 2: Diffraction, Chapter 36***
- ***Thursday September 4: Diffraction, Chapter 36***
- ***Tuesday September 9: Finish Diffraction, start Special Relativity Chapter 37***
- ***Thursday September 11: Relativity, Chapter 37***
- ***Tuesday September 16: Relativity, Chapter 37***
- ***Thursday September 18: Special Relativity, Chapter 37***
- ***Tuesday September 23: Special Relativity, General Relativity, Chapter 37***
- ***Thursday September 25: Waves as particles:  
Photo-electric effect, Bremsstrahlung, Compton Scattering, Pair Production,  
Chapter 38***
- ***Tuesday September 30: Waves as particles: Heisenberg Uncertainty Principle  
Chapter 38,  
Particles as Waves, Chapter 39  
(substitute Prof. Sven Vahsen)***
- ***Thursday October 2: Particles as Waves, Chapter 39 (cont'd)  
(substitute Prof. Sven Vahsen)***

- ***Tuesday October 7: Review for Midterm I (substitute Mr. Ethan Lee)***
- ***Thursday October 9: Midterm I***
- ***Tuesday October 14: Finish Particles as Waves, Chapter 39  
Bohr model review, laser***
- ***Thursday October 16: Chapter 40 Quantum Mechanics I***
- ***Tuesday October 21: Chapter 40, Quantum Mechanics I***
- ***Thursday October 23: Chapter 40, Finish Quantum Mechanics I,  
Start QM II (Schrodinger equation in 3-D)***
- ***Tuesday October 28: Chapter 41, Quantum Mechanics II, Hydrogen quantum  
numbers ( $n, l, m$ )***
- ***Thursday October 30: Chapter 41, Quantum Mechanics II, Angular Momentum,  
Spin and the Pauli Exclusion Principle***
- ***Tuesday November 4: Chapter 41, Quantum Mechanics II, Spin-Orbit, Fine  
Structure, Periodic Table,  
Atomic Structure, X-ray spectroscopy, QM Entanglement***
- ***Thursday November 6: Start Chapter 42, Molecules and Condensed Matter,  
Diatomic Molecules***
- ***Tuesday November 11: Veteran's Day (no class)***
- ***Thursday November 13: Chapter 42, Molecules and Condensed Matter***
- ***Tuesday November 18, Review for Midterm II***
- ***Thursday November 20: Midterm II***
- ***Tuesday November 25: No in-person class, slides on Chapter 42, will be posted.***
- ***Thursday November 27: Thanksgiving Break***

- *Tuesday December 2: Chapter 43, Superconductivity, Nuclear Physics*
- *Thursday December 4: Chapter 43, Nuclear Physics*
- *Tuesday December 9: Chapter 43, Nuclear Physics*
- *Thursday December 11: Review*
  
- *Final Exam: Tuesday December 16th, 2:15-4:15 pm*

*Travel/Meetings for T. Browder (substitutes and exams):  
Sept 27-Oct 13, Belle II General Meeting and Belle II Physics Week.  
Dec 13-Dec 24, Experimental shifts at SuperKEKB*