



PHYS 111: College Physics I

Term: Fall 2026

Credits: 4.0

Meeting Times & Location: Multiple sections. Your section's days, time, room, and instructor are listed in AlkimiHub and on your Canvas course page.

Modality: In-Person

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Instructor Information

- **Course Coordinator:** Dr. Megan Hollander (Assistant Teaching Professor of Physics)
- **Section Instructors:** Listed for each section in AlkimiHub. Your section instructor's office hours and office are posted in your Canvas course page.
- **Email:** mhollander@university.alkimi.ai
- **Office:** Meridian Science Center 414
- **Coordinator Office Hours:**
 - Monday & Wednesday: 3:00–4:30 p.m. (In person, Meridian Science Center 414)
 - Tuesday: 11:00 a.m.–12:00 p.m. (Virtual via Zoom; link posted in Canvas)
 - Also available by appointment.

Course Description

Algebra- and trigonometry-based mechanics: kinematics, Newton's laws, work and energy, momentum, rotation, fluids, oscillations, and heat, with a weekly three-hour laboratory. Designed for life science, pre-health, and kinesiology students. PHYS 111 provides an algebra- and trigonometry-based introduction to classical mechanics and thermal physics tailored for students in the biological sciences, exercise science, and pre-health pathways. We explore translational and rotational kinematics, Newton's laws of motion, work-energy principles, impulse and linear momentum, fluid statics and dynamics, harmonic oscillations, and thermodynamic processes. Emphasis is placed on translating physical principles into quantitative models that explain physiological, anatomical, and biomechanical systems.

Prerequisites

MATH 110 or placement.

Measurable Student Learning Outcomes

Upon successful completion of PHYS 111, students will be able to:

1. **Analyze Kinematics in One and Two Dimensions:** Apply algebraic and trigonometric equations of motion to model linear motion, free fall, projectile trajectories, and uniform circular motion.
2. **Apply Newton's Laws of Motion:** Construct free-body diagrams to evaluate static equilibrium and dynamic force interactions, including gravitational, normal, frictional, and tension forces.

3. **Implement Conservation Principles:** Utilize conservation of mechanical energy and conservation of linear momentum to solve collision, work-energy, and impulse problems in physical and biological contexts.
4. **Evaluate Rotational Dynamics and Equilibrium:** Calculate torque, center of mass, moment of inertia, and angular momentum for rigid bodies in rotational equilibrium and dynamic motion.
5. **Examine Fluids and Oscillatory Systems:** Apply Archimedes' principle, Pascal's principle, the continuity equation, Bernoulli's equation, and simple harmonic motion equations to fluid and mechanical systems.
6. **Investigate Thermal Physics and Thermodynamics:** Solve quantitative problems involving temperature scales, thermal expansion, specific heat, latent heat, and the first and second laws of thermodynamics.

Required Course Materials & Approximate Costs

1. **Serway, Raymond A., and Chris Vuille. *College Physics*. 11th ed., Cengage Learning, 2018.** Approx. \$45 for digital rental; approx. \$125 for print purchase.
2. **OpenStax College Physics. Free digital access at openstax.org.** Free.
3. **Scientific or graphing calculator (TI-30X, TI-84, or equivalent; smartphone calculators prohibited on exams).** Approx. \$15 to \$90.
4. **Total estimated cost:** \$15 to \$135.

Generative AI Policy (AI Level 1: AI Not Permitted for Graded Work)

In accordance with Alkimi University Academic Policies (Student Handbook §5.8), PHYS 111 operates under **AI Level 1**.

- **What is permitted:** You may use AI tools for conceptual explanations, generating practice algebra problems, or clarifying physical intuition during your personal study outside of graded assignments.
- **What is prohibited:** You may not use AI tools to solve, verify, or generate work for weekly homework assignments, pre-lab exercises, laboratory analysis, or the capstone project. AI use of any kind is strictly prohibited during all quizzes and examinations.
- **Disclosure:** Whenever an AI tool is consulted for study assistance, you must maintain personal integrity; if prompted on any inquiry, provide a brief written acknowledgment stating which tool was consulted and for what study purpose.

Grading Components and Weights

- **Midterm Exam 1:** 15% (In class during week 5 (week of September 21))
- **Midterm Exam 2:** 15% (In class during week 10 (week of October 26))
- **Weekly Homework Problem Sets:** 15% (Due Fridays at 11:59 p.m. in Canvas (weeks 2–13; lowest dropped))
- **Laboratory Assignments & Practicum:** 20% (Weekly laboratory write-ups submitted in Canvas; lab sections meet weekly)
- **Concept Quizzes:** 10% (Weekly pre-lecture Canvas quizzes due Mondays at 11:59 p.m.; lowest two dropped)
- **Biomechanics Capstone Final Project:** 25% (Due Monday, December 14, 2026 at 11:59 p.m.)

Grading Scale (Alkimi University Standard)

- **A:** 93–100% | **A-:** 90–92%
- **B+:** 87–89% | **B:** 83–86% | **B-:** 80–82%
- **C+:** 77–79% | **C:** 73–76% | **C-:** 70–72%
- **D+:** 67–69% | **D:** 60–66% | **F:** Below 60%
- **Extra credit:** No individual extra credit assignments are offered in coordinated multi-section courses.

Course Schedule (Fall 2026)

All sections follow this common weekly schedule. Section meeting days vary, so dates are shown by week; your section instructor posts exact class dates in Canvas.

Week	Dates	Topics & Readings	Assignments & Deadlines
Week 1	Aug 26–Aug 28	Units, Measurements, and Vectors: SI units, dimensional analysis, scalar versus vector quantities, vector components, and trigonometric decomposition. <i>Reading: Serway Ch. 1</i>	<i>First day of classes: Wed Aug 26.</i>
Week 2	Aug 31–Sep 4	One-Dimensional Kinematics: Position, displacement, average and instantaneous velocity, constant acceleration, and free-fall motion. <i>Reading: Serway Ch. 2</i>	<i>Wed Sep 2: Add/section change deadline.</i>
Week 3	Sep 8–Sep 11	Two-Dimensional Motion and Projectiles: Vector addition, projectile motion trajectories, range equations, and independence of horizontal and vertical motions. <i>Reading: Serway Ch. 3</i>	<i>Mon Sep 7: Labor Day (no classes). Wed Sep 9: Census date (last day to drop without a W).</i>
Week 4	Sep 14–Sep 18	Newton's Laws of Motion: First and second laws, mass, weight, free-body diagrams, and Newton's third law interaction pairs. <i>Reading: Serway Ch. 4.1–4.4</i>	—
Week 5	Sep 21–Sep 25	Applications of Force and Friction & Midterm Exam 1: Static and kinetic friction, inclined planes, tension in cables, coupled bodies; Midterm Exam 1 in class. <i>Reading: Serway Ch. 4.5–4.8</i>	Midterm Exam 1 (in class this week).
Week 6	Sep 28–Oct 2	Work and Kinetic Energy: Definition of work by constant and variable forces, kinetic energy, and the work-energy theorem. <i>Reading: Serway Ch. 5.1–5.3</i>	—
Week 7	Oct 5–Oct 9	Potential Energy and Conservation of Energy: Gravitational and elastic potential energy, conservative versus nonconservative forces, and mechanical power. <i>Reading: Serway Ch. 5.4–5.7</i>	—
Week 8	Oct 14–Oct 16	Momentum, Impulse, and Collisions: Linear momentum, impulse-momentum theorem, conservation of linear momentum, and elastic versus inelastic collisions. <i>Reading: Serway Ch. 6</i>	<i>Oct 12–Oct 13: Fall break (no classes). Fri Oct 16: Midterm grades due.</i>
Week 9	Oct 19–Oct 23	Rotational Motion and Angular Kinematics: Angular displacement, angular velocity, angular acceleration, centripetal acceleration, and Newtonian gravitation. <i>Reading: Serway Ch. 7</i>	—
Week 10	Oct 26–Oct 30	Rotational Dynamics and Equilibrium & Midterm Exam 2: Torque, conditions for static equilibrium, center of gravity, moment of inertia, and angular momentum; Midterm Exam 2 in class. <i>Reading: Serway Ch. 8</i>	Midterm Exam 2 (in class this week).
Week 11	Nov 2–Nov 6	Solids and Fluid Statics: States of matter, density, hydrostatic pressure, Pascal's principle, and Archimedes' principle of buoyancy. <i>Reading: Serway Ch. 9.1–9.5</i>	<i>Fri Nov 6: Last day to withdraw (W) or elect Pass/No Pass.</i>
Week 12	Nov 9–Nov 13	Fluid Dynamics and Viscosity: Fluids in motion, equation of continuity, Bernoulli's equation, Poiseuille flow, and applications to blood circulation. <i>Reading: Serway Ch. 9.6–9.9</i>	—
Week 13	Nov 16–Nov 20	Thermal Physics and Temperature: Zeroth law of thermodynamics, thermometers, temperature scales, thermal expansion of solids and liquids, and ideal gases. <i>Reading: Serway Ch. 10</i>	—
Week 14	Nov 23–Nov 24	Energy in Thermal Processes: Heat capacity, specific heat, latent heat, phase changes, and conduction, convection, and radiation mechanisms. <i>Reading: Serway Ch. 11</i>	<i>Nov 25–Nov 27: Thanksgiving break (no classes).</i>
Week 15	Nov 30–Dec 4	The Laws of Thermodynamics: First law of thermodynamics, thermodynamic work, PV diagrams, heat engines, second law, and entropy. <i>Reading: Serway Ch. 12</i>	—

Week	Dates	Topics & Readings	Assignments & Deadlines
Week 16	Dec 7–Dec 9	Oscillations, Waves, and Capstone Synthesis: Hooke's law, simple harmonic motion, period of pendulum and mass-spring systems, and final capstone project presentations. <i>Reading: Serway Ch. 13 & Review</i>	<i>Wed Dec 9: Last day of classes. Thu Dec 10: Reading Day.</i>
Finals	Dec 14	Biomechanics Capstone Final Project due Monday, December 14, 2026 at 11:59 p.m.	No final examination.

Course Policies

Attendance Policy

Because PHYS 111 is a coordinated, laboratory-integrated course, active engagement in all lecture and laboratory sessions is essential. If you must miss a class or laboratory due to illness or official university business, contact Dr. Hollander and your section instructor in advance. More than two unexcused lab absences will result in a failing grade. Students who miss the first two class meetings without notifying the instructor may be dropped. Students may miss class for religious observance without penalty if they notify the instructor in writing within the first two weeks of the semester (by Wednesday, September 9, 2026). Absences for university-sponsored activities (athletics, performances, conferences) are excused with a letter from the sponsoring office at least one week in advance.

Late Work Policy

Homework problem sets submitted within 24 hours after the Friday deadline receive a 20% penalty; submissions beyond 24 hours are not accepted as solutions are posted immediately. Canvas reading quizzes cannot be completed late, but the two lowest scores are dropped automatically at the conclusion of the semester.

Final Exam Policy

PHYS 111 has no final examination. The biomechanics capstone final project takes its place. Nothing is due on Reading Day (Thursday, December 10, 2026).

Academic Integrity

Alkimi University is an academic community devoted to rigorous scholarship, open intellectual inquiry, and uncompromising ethical conduct. All students are subject to the regulations of the Alkimi University Academic Integrity Policy. Academic dishonesty—including plagiarism, cheating on examinations, unauthorized collaboration, fabrication of empirical data, and unauthorized submission of academic work generated by artificial intelligence—undermines the integrity of the university and carries severe disciplinary sanctions. Sanctions range from a failing grade on an assignment or exam to an administrative course failure recorded as an 'XF' on the official transcript, academic suspension, or expulsion. Suspected violations are formally investigated and resolved through the Office of Academic Integrity in accordance with Faculty Handbook §6. For detailed information, consult the Office of Academic Integrity, Lovell Hall 315, (555) 555-0163, integrity@university.alkimi.ai.

Accessibility Services

Alkimi University is committed to providing equitable educational access and reasonable accommodations for all students with documented disabilities, including physical, sensory, psychological, learning, and chronic health conditions. Students requesting academic accommodations must formally register with the Office of Accessibility Services, Harlan Hall 204, (555) 555-0155, access@university.alkimi.ai. Once approved, students will receive an official Faculty Accommodation Letter detailing approved accommodations. Students should present this letter to the instructor as early in the semester as possible, and at least one

week prior to any exam or assignment requiring accommodation. Accommodations cannot be applied retroactively.

Student Wellness and Mental Health

Your physical health, psychological well-being, and mental health are essential to your academic success. If you experience heightened stress, anxiety, depressive symptoms, personal trauma, or academic burnout, free, confidential counseling and medical care are available through the Hollis Health & Counseling Center, located in the Hollis Center. Routine appointments are available Monday–Friday 8:00 a.m.–6:00 p.m. and Saturday 10:00 a.m.–2:00 p.m. during the semester by calling (555) 555-0190 or emailing health@university.alkimi.ai. Urgent, 24/7 crisis psychological counseling is accessible immediately at (555) 555-0199.

Campus Student Support Services

- **Academic Advising Center:** Lovell Hall 101 | (555) 555-0158 | advising@university.alkimi.ai
- **Writing Center:** Whitcombe Library 3rd Floor | Free consultations on papers, reports, and research projects at any stage.
- **Whitcombe Library:** Whitcombe Library, Main Floor | (555) 555-0170 | askalibrarian@university.alkimi.ai
- **Hollis Health & Counseling Center:** Hollis Center | (555) 555-0190 | 24/7 Counseling Line: (555) 555-0199 | health@university.alkimi.ai
- **Supplemental Instruction (SI):** Peer-led Supplemental Instruction sessions are facilitated three times per week for 50 minutes each by trained undergraduate SI Leaders. Sessions are entirely free, require no advance registration, and provide collaborative problem-solving practice. Schedule and session locations are posted on AlkimiHub and Canvas during week 1.
- **Physics Tutoring Center:** Drop-in peer tutoring and conceptual assistance are available Monday through Thursday from 2:00 to 6:00 p.m.