Physics (PHYS) 204

Physics for Scientists and Engineers I (Revision 3)

Status:	Replaced with new revision, see the **course listing** for the current revision
Delivery mode:	**Individualized study online** with **eText**, and a **Home Lab**. PHYS 204 has a **lab exemption** This course is charged a **lab fee**
Credits:	3
Area of study:	Science
Prerequisites:	**MATH 260** or **MATH 265** or equivalent (can be taken concurrently with **MATH 260** or **MATH 265**)
Precluded:	**PHYS 200**
Challenge:	PHYS 204 is not available for challenge.
Faculty:	Faculty of Science and Technology
Notes:	**Detailed Syllabus and Assessment** (PDF)

Overview

PHYS 204 is an introductory calculus-based physics course recommended for science, engineering, and pre-med students. The course covers material on classical mechanics as outlined below. It also includes a laboratory component that involves completing hands-on experiments. In addition to the eText, the course material includes a carefully written Study Guide, enriched with animation and dynamic diagrams, designed for independent learning. PHYS 204 combined with PHYS 205 is the equivalent of one year of introductory calculus-based physics.

Outline

PHYS 204 comprises the following thirteen units:

- Unit 1: Physics and Measurement
- Unit 2: Motion in One Dimension
- Unit 3: Vectors
- Unit 4: Motion in Two Dimensions
- Unit 5: The Laws of Motion
- Unit 6: Circular Motion
- Unit 7: Energy of a System
- Unit 8: Conservation of Energy
- Unit 9: Linear Momentum and Collisions
- Unit 10: Rotation of a Rigid Body About a Fixed Axis
- Unit 11: Angular Momentum
- Unit 12: Static Equilibrium and Elasticity
- Unit 13: Universal Gravitation

Lab Component

PHYS 204 includes a compulsory lab component that comprises six hands-on experiments performed in a place of the student's choice. Procedures involve video capture and analysis of moving objects and require common household

items such as the video camera in a smartphone. Assessment is based on written lab reports. The following lab experiments are explained in the PHYS 204 course materials:

- Lab 1: Graphical Analysis
- Lab 2: Kinematics in One Dimension
- Lab 3: Projectile Motion
- Lab 4: Hooke's Law
- Lab 5: Collision in Two Dimensions
- Lab 6: Rolling Motion

Students may qualify for partial or full **transfer of lab credit** obtained for equivalent lab work at another institution.

Learning outcomes

Upon successful completion of this course, a student should be able to

- convert between different units and express a physical quantity in scientific notation using the appropriate number of significant digits.
- explain the relationships between time, displacement, velocity, and constant acceleration and use calculus to solve kinematic problems in one or two dimensions.
- analyze and solve dynamic problems using vector calculus, Newton's three laws of motion, and frictional forces.
- state the work–kinetic energy theorem and the conservation of energy principle and use calculus to analyze systems that involve conservative and nonconservative forces.
- state the conservation of linear momentum principle and apply it to solve problems that involve one- and two-dimensional (elastic and inelastic) collisions.
- define center of mass and torque vector and solve problems that involve static equilibrium of extended bodies.
- analyze and solve problems that involve the kinematics and dynamics of rotational motion and the conservation of angular momentum principle.
- state Hooke's law and describe elastic properties of solids and apply

formulas for calculating Young's modulus, bulk modulus, and shear modulus.

- state Newton's law of universal gravitation and define gravitational potential and apply them to solve problems involving the force of gravity and satellite motion.
- demonstrate skills related to performing simple experiments in classical mechanics, including experimental setup, data acquisition, data analysis, and communication of scientific results.

Evaluation

The final grade is based on the marks achieved in two assignments, six lab reports, and two examinations. To **receive credit** , the student must achieve a minimum of **fifty percent (50%)** on the final examination and on the lab component, and an overall course grade of at least D (fifty percent). The following table describes the credit weight associated with each course requirement:

Activity	**Weight**
Assignments	20%
Lab Reports	20%
Midterm Online Exam	20%
Final Online Exam	40%
Total	**100%**

The **midterm and final examinations** for this course must be requested in advance and written under the supervision of an AU-approved exam invigilator. Invigilators include either ProctorU or an approved in-person invigilation centre that can accommodate online exams. Students are responsible for payment of any invigilation fees. Information on exam request deadlines, invigilators, and other exam-related questions, can be found at the **Exams and grades** section of the Calendar.

To learn more about assignments and examinations, please refer to Athabasca

University's **online Calendar** .

Materials

Serway, Raymond A. and Jewett, John W., Jr. (2014). *Physics for Scientists and Engineers* (9th ed.). Boston, MA: Cengage Learning. (eText)

eText

Registration in this course includes an electronic textbook. For more information on **electronic textbooks** , please refer to our **eText Initiative site** .

Other Resources

All other learning resources will be available online.

Important links

- **Academic advising**
- **Program planning**
- **Request assistance**
- **Support services**

Athabasca University reserves the right to amend course outlines occasionally and without notice. Courses offered by other delivery methods may vary from their individualized study counterparts.

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View **previous revision**