PHYS-202 – Introduction to Modern Physics

University Arts and Science

Effective Term & Year: Fall 2025
Course Outline Review Date: 2026-09-01

Program Area: Math and Sciences

Description:

Modern Physics covers Einstein’s theory of special relativity, elementary quantum mechanics, and processes in atomic, and nuclear physics.

Program Information:

This course is an important and exciting course in twentieth century physics, and a necessary course on the way to a BSc in physics.

Delivery Methods: On-campus (Face-to-Face)

Credit Type: College of the Rockies Credits

Credits: 3

Course type/s: Lab Sciences, Sciences

Instructional Activity and Hours:

Activity	Hours
Classroom, Directed Studies or Online Instruction	45
Seminar/Tutorials	
Laboratory/Studio	45
Practicum/Field Experience	
Co-op/Work Experience	
Other	

Total	90

Course Requisites:

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Prior Learning and Recognition: Yes

In some cases students may be able to apply for recognition of prior learning outside the classroom. This flexible assessment process provides equivalent course credit. It is a rigorous process that may include external evaluation, worksite assessment, demonstration, standardized test, self-assessment, interview, products/portfolio, and challenge exam, or other measures as appropriate. Tuition fees apply. Contact an education advisor for more information.

Course Transfer Credit:

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see https://www.bctransferguide.ca/ or https://transferalberta.alberta.ca . For more transfer credit information, please visit https://www.cotr.bc.ca/Transfer

All requests for course transfer credit from institutions in British Columba or elsewhere should go to the College of the Rockies Enrolment Services office.

Textbook Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

Modern Physics, Taylor et al (2nd Edition). Prentice Hall (2004).

Please see the instructor's syllabus or check COTR's online text calculator https://textbook.cotr.bc.ca/ for a complete list of the currently required textbooks.

Learning Outcomes:

Upon the successful completion of this course, students will be able to:

- define the term ‘wave-particle duality’ and describe physical situations where it applies;
- use Lorenz transformations to convert measurements between reference frames;
- use Lorenz transformations to determine the measured half-life of decaying particles;
- use the four-momentum of a moving object to interpret energy and inertial mass;
- describe the changing attributes of the spectrum of a radiating black body as it increases or decreases in temperature;
- solve the Schrodinger Equation in one dimension to describe scattering and quantum tunneling;
- define the Heisenberg Indeterminacy relation and describe how it relates to physical measurement;
- use the solution of the Schrodinger Equation in three dimensions to describe the absorption and emission properties of the hydrogen atom; and
- work in a suitable 2nd year physics laboratory setting.

Course Topics:

- Lorenz transformations of measurements
- Relativistic momentum
- Spacetime
- Diffraction of waves in the Double Slit experiment
- Quantum Theory of Light
- Wave Particle Duality
- The Schrodinger Equation and Quantum mechanics in one dimension
- Quantum Tunneling
- Heisenberg Indeterminacy relation
- Stimulated emission and LASERs
- Quantum mechanics in three dimensions and Atomic Structure
- Radioactive Decay
- Scattering

See instructor’s syllabus for the detailed outline of weekly readings, activities and assignments.

Evaluation and Assessments

Assessment Type: On-Campus (face-to-face)

Assessment Type	% of Total Grade
Assignments	15%
Quizzes	15%
Laboratory	15%
Midterms	30%
Final Exam	25%
Total	100%

Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	<50

No pass requirements available.

Evaluation Notes: A grade of “D” grants credit, but may not be sufficient as a prerequisite for sequential courses.

Evaluation Notes Comments:

Please see the instructor syllabus for specific classroom policies related to this course, such as details of evaluation, penalties for late assignments and use of electronic aids.

Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a “0” on the exam.

Academic Policies:

College of the Rockies policies related to courses can be found at https://cotr.bc.ca/about-us/college-policies/ and include the following:

- Policy 2.4.3 Students with Documented Disabilities
- Policy 2.4.4 Student Conduct (plagiarism, other cheating, behavioral misconduct)
- Policy 2.5.8 Academic Performance
- Policy 2.5.3 Grade Appeal
- Policy 2.4.9 Student Concerns Re Faculty

Course Changes:

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.