COLLEGE OF THE ROCKIES

Introduction to Modern Physics – PHYS 202

University Studies Program

Course Outline

COURSE IMPLEMENTATION DATE: **May 2000**
OUTLINE EFFECTIVE DATE: **January 2021**
COURSE OUTLINE REVIEW DATE: **September 2026**

GENERAL COURSE 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: This course is delivered face-to-face in a classroom and lab setting.

COTR Credits: 3

Hours for this course: 90 hours

Typical Structure of Instructional Hours:

Instructional Activity	Duration
Lecture Hours	45
Seminars / Tutorials	
Laboratory / Studio Hours	45
Practicum / Field Experience Hours	
Other Contact Hours	
Total	90

Practicum Hours (if applicable):

Type of Practicum	Duration
On-the-job Experience	N/A
Formal Work Experience	N/A
Other	N/A
Total	

Course Outline Author or Contact:
Benjamin Tippett, PhD

Signature

APPROVAL SIGNATURES:

Department Head
Erin Aasland Hall
E-mail: aaslandhall@cotr.bc.ca

Department Head Signature

Dean of Business and University Studies
Darrell Bethune
E-mail: bethune@cotr.bc.ca

Dean Signature

EDCO

Valid from: January 2021-September 2026

Education Council Approval Date

COURSE PREREQUISITES AND TRANSFER CREDIT:

Prerequisites: PHYS 104, MATH 104, and MATH 201

Corequisites: MATH 203 and MATH 221.
It is recommended that the student enroll in MATH 202.
These courses may be taken concurrently or sequentially.

Flexible Assessment (FA):

Credit can be awarded for this course through FA ☑ Yes ☐ No

Learners may request formal recognition for flexible assessment at the College of the Rockies through one or more of the following processes: External Evaluation, Worksite Assessment, Demonstration, Standardized Test, Self-assessment, Interview, Products/Portfolio or Challenge Exam. Contact an Education Advisor for more information.

Transfer Credit: For transfer information within British Columbia, Alberta and other institutions, please visit http://www.cotr.bc.ca/Transfer.

Students should also contact an academic advisor at the institution where they want transfer credit.

Prior Course Number: N/A

Textbooks and Required 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 http://go.cotr.bc.ca/tuition/tCalc.asp 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 ASSESSMENT:

Assignments	% Of Total Grade
Assignments	15%
Quizzes	15%
Laboratory	15%
Midterms	30%
Final Exam	25%
Total	100%

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 POLICY:

Students must attend all required scheduled exams that make up a final grade at the appointed time and place.

Individual instructors may accommodate for illness or personal crisis. Additional accommodation will not be made unless a written request is sent to and approved by the appropriate Department Head prior to the scheduled exam.

Any student who misses a scheduled exam without approval will be given a grade of "0" for the exam.

COURSE GRADE:

Course grades are assigned as follows:

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Mark (Percent)	≥ 90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	< 50

A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

ACADEMIC POLICIES:

See www.cotr.bc.ca/policies for general college policies related to course activities, including grade appeals, cheating and plagiarism.

COURSE CHANGES:

Information contained in course outlines is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational, employment and marketing needs. The instructor will endeavour to provide notice of changes to students as soon as possible. The instructor reserves the right to add or delete material from courses.