PHYS 106: INTRODUCTION TO MODERN PHYSICS

In Workflow

1. PHYS Committee Chair (mikkel.jensen@csus.edu)
2. PHYS Chair (degraff@csus.edu)
3. NSM College Committee Chair (mikkel.jensen@csus.edu)
4. NSM Dean (datwyler@csus.edu)
5. Academic Services (catalog@csus.edu)
6. Senate Curriculum Subcommittee Chair (curriculum@csus.edu)
7. GE Crs Rev Subcomittee Chair (perry@csus.edu)
8. Dean of Undergraduate (gardner@csus.edu)
9. Dean of Graduate (cnewsome@skymail.csus.edu)
10. Catalog Editor (catalog@csus.edu)
11. Registrar's Office (k.mcfarland@csus.edu)
12. PeopleSoft (PeopleSoft@csus.edu)

Approval Path

1. Fri, 28 Feb 2025 19:40:22 GMT
   Mikkel Jensen (mikkel.jensen): Approved for PHYS Committee Chair
2. Fri, 28 Feb 2025 19:40:56 GMT
   William DeGraffenreid (degraff): Approved for PHYS Chair
3. Thu, 06 Mar 2025 01:36:20 GMT
   Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
4. Thu, 06 Mar 2025 15:56:21 GMT
   Chris Taylor (ctaylor): Approved for NSM Dean

Date Submitted: Wed, 22 Jan 2025 20:45:23 GMT

Viewing: PHYS 106 : Introduction to Modern Physics

Last edit: Thu, 06 Mar 2025 01:36:12 GMT

Changes proposed by: Mikkel Jensen (218650862)

Contact(s):

Name (First Last)	Email	Phone 999-999-9999
Mikkel Herholdt Jensen	mikkel.jensen@csus.edu	916-278-7687

Catalog Title:
Introduction to Modern Physics

Class Schedule Title:
Intro To Modern Physics

Academic Group: (College)
NSM - Natural Sciences & Mathematics

Academic Organization: (Department)
Physics and Astronomy

Will this course be offered through the College of Continuing Education (CCE)?
No

Catalog Year Effective:
Fall 2026 (2026/2027 Catalog)

Subject Area: (prefix)
PHYS - Physics

Catalog Number: (course number)
106

Course ID: (For administrative use only.)
158361

Units:
3

Is the ONLY purpose of this change to update the term typically offered or the enforcement of existing requisites at registration?
No

In what term(s) will this course typically be offered?
Fall, Spring

Does this course require a room for its final exam?
Yes, final exam requires a room

This course complies with the credit hour policy:
Yes

Justification for course proposal:
PHYS 106 introduces students to modern physics (relativity and quantum mechanics) and the experiments that lead to that scientific revolution in the late XIXth/early XXth century. This fits very well in the requirement for an upper-division GE course. We propose to change the course to a GE Area B.5 course. This does not require any changes to its content outside adding a writing requirement. This will allow physics majors and minors to satisfy the GE upper-division breadth requirement of E.O. 1100.

This form also introduces learning outcomes to the workflow system, which were not previously present as the course predates this system.

Course Description: (Not to exceed 90 words and language should conform to catalog copy.)
Basic concepts of special relativity and quantum theory of matter. Phenomenological study of atomic and molecular energy states and spectra. Elements of solid-state and nuclear physics.

Are one or more field trips required with this course?
No

Fee Course?
No

Is this course designated as Service Learning?
No

Is this course designated as Curricular Community Engaged Learning?
No

Does this course require safety training?
No

Does this course require personal protective equipment (PPE)?
No

Does this course have prerequisites?
Yes

Prerequisite:
MATH 31
PHYS 11A, PHYS 11B, and PHYS 11C; or PHYS 5A and PHYS 5B

Prerequisites Enforced at Registration?
Yes

Does this course have corequisites?
No

Graded:
Letter

Approval required for enrollment?
No Approval Required

Course Component(s) and Classification(s):
Discussion

Discussion Classification
CS#04 - Lecture /Recitation (K-factor=1 WTU per unit)
Discussion Units
3

Is this a paired course?
No

Is this course crosslisted?
No

Can this course be repeated for credit?
No

Can the course be taken for credit more than once during the same term?
No

Description of the Expected Learning Outcomes and Assessment Strategies:

List the Expected Learning Outcomes and their accompanying Assessment Strategies (e.g., portfolios, examinations, performances, pre-and post-tests, conferences with students, student papers). Click the plus sign to add a new row.

	Expected Learning Outcome	Assessment Strategies
1	Analyze relativistic effects such as time dilation, length contraction, and relativity of simultaneity.	Quizzes, homework, midterms, final exam.
2	Apply concepts of special relativity, such as Lorentz transformations (including velocity addition), relativistic momentum, and energy through problem solving.	Quizzes, homework, midterms, final exam.
3	Describe the various pre-quantum-mechanics models of the atom and their limitations.	Quizzes, homework, midterms, final exam.
4	Apply concepts of quantum mechanics such as particle-wave duality, the Heisenberg uncertainty principle, wave functions, probability density, the Pauli exclusion principle, and spin.	Quizzes, homework, midterms, final exam.
5	Identify solutions to the Schrodinger equation for example 1-dimensional potentials, such as the infinite square well potential.	Quizzes, homework, midterms, final exam.
6	Apply the Schrodinger equation to qualitatively sketch the wavefunction for various potential energies, such as the infinite square well, finite square well, and 1-dimensional harmonic oscillator.	Quizzes, homework, midterms, final exam.
7	Apply the principles of wave mechanics to explain quantum mechanical phenomena, such as quantum tunneling.	Quizzes, homework, midterms, final exam.
8	Explain some of the various applications of quantum mechanics, including the model of the Hydrogen atom, as well as other examples, such as larger atoms and nuclear physics.	Quizzes, homework, midterms, final exam.
9	Cite critical observations, underlying assumptions, and limitations to explain and apply important ideas and models in physical sciences	Written post-class summaries, short essays
10	Discuss historical or philosophical perspectives pertaining to the practice of science	Written post-class summaries, short essays
11	Recognize evidence-based conclusions and form reasoned opinions about science-related matters of personal, public and ethical concern	Written post-class summaries, short essays

Is this course required in a degree program (major, minor, graduate degree, certificate?)

Yes

Has a corresponding Program Change been submitted to Workflow?

No

Identify the program(s) in which this course is required:

Programs:
BS in Physics (General Physics)
BS in Physics (Applied Physics)
BA in Physics
BA in Physics (Teacher Preparation)
Minor in Physics
BS in Physics (Biophysics)

Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer)?

No

Will there be any departments affected by this proposed course?

No

I/we as the author(s) of this course proposal agree to provide a new or updated accessibility checklist to the Dean's office prior to the semester when this course is taught utilizing the changes proposed here.

I/we agree

University Learning Goals

Undergraduate Learning Goals:

Competence in the disciplines
Knowledge of human cultures and the physical and natural world
Intellectual and practical skills

Is this course required as part of a teaching credential program, a single subject, or multiple subject waiver program (e.g., Liberal Studies, Biology) or other school personnel preparation program (e.g., School of Nursing)?

No

GE Course and GE Goal(s)

Is this a General Education (GE) course or is it being considered for GE?

Yes

In which GE area(s) does this apply?

B5

Which GE objective(s) does this course satisfy?

Use mathematical ideas to accomplish a variety of tasks.
Gain a general understanding of current theory, concepts, knowledge, and scientific methods pertaining to the nature of the physical universe, ecosystems, and life on this planet.

Attach Course Syllabus with Detailed Outline of Weekly Topics:

PHYS106.docx

Syllabi must include: GE area outcomes listed verbatim; catalog description of the course; prerequisites, if any; student learning objectives; assignments; texts; reading lists; materials; grading system; exams and other methods of evaluation.

Will more than one section of this course be offered?

No

Key: 3901