

PHYS 250: ADVANCED QUANTUM MECHANICS

In Workflow

1. PHYS Committee Chair (mikkel.jensen@csus.edu)
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Approval Path

1. Fri, 13 Sep 2024 20:17:22 GMT
Mikkel Jensen (mikkel.jensen): Approved for PHYS Committee Chair
2. Fri, 13 Sep 2024 20:20:57 GMT
William DeGraffenreid (degraff): Approved for PHYS Chair
3. Wed, 16 Oct 2024 22:14:23 GMT
Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
4. Mon, 21 Oct 2024 20:31:49 GMT
Chris Taylor (ctaylor): Approved for NSM Dean

New Course Proposal

Date Submitted: Wed, 11 Sep 2024 16:29:23 GMT

Viewing: PHYS 250 : Advanced Quantum Mechanics

Last edit: Wed, 16 Oct 2024 22:12:59 GMT

Changes proposed by: Rodolfo Barniol Duran (219696192)

Contact(s):

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Catalog Title:

Advanced Quantum Mechanics

Class Schedule Title:

Advanced Quantum Mechanics

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 2025 (2025/2026 Catalog)

Subject Area: (prefix)

PHYS - Physics

Catalog Number: (course number)

250

Course ID: (For administrative use only.)

TBD

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?

Spring term only - even years

Does this course require a room for its final exam?

Yes, final exam requires a room

Does this course replace an existing experimental course?

No

This course complies with the credit hour policy:

Yes

Justification for course proposal:

Physics 250 comprises one of the key electives of the new Master of Science in Physics program. While not an essential part of every student's postgraduate experience, an understanding of advanced quantum mechanical processes is key to modern research in particle physics, condensed matter, optics and many more.

Course Description: (Not to exceed 90 words and language should conform to catalog copy.)

Advanced quantum mechanics, including classical fields; quantization of fields; quantum theory of radiation; relativistic quantum mechanics of spin-half particles; covariant perturbation theory; application of second quantization method to atomic physics, particle physics, statistical mechanics, and solid-state 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:

PHYS 124, PHYS 135, PHYS 151, or instructor permission.

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):

Seminar

Seminar Classification

CS#05 - Seminar (K-factor=1 WTU per unit)

Seminar 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	Use wave mechanics to solve for the dynamics within quantum-mechanical potentials.	Quizzes, graded homework, midterm and final exams
2	Derive the quantized orbital and spin angular momenta in a variety of systems.	Quizzes, graded homework, midterm and final exams
3	Use approximation techniques, such as perturbation theory, to solve dynamics in complex potentials.	Quizzes, graded homework, midterm and final exams
4	Apply models of scattering to quantum mechanical processes.	Quizzes, graded homework, midterm and final exams
5	Examine quantum properties in a variety of fields of physics; such as atomic physics, condensed matter, and electromagnetism.	Quizzes, graded homework, midterm and final exams

Attach a list of the required/recommended course readings and activities:

PHYS 250 Quantum.docx

For whom is this course being developed?

Majors in the Dept

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

No

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

Graduate (Masters) Learning Goals:

Disciplinary knowledge
Critical thinking/analysis

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

Is this a Graduate Writing Intensive (GWI) course?

No

Key: 14838