

PHYS 242: ADVANCED SOLID STATE 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. Dean of Undergraduate (gardner@csus.edu)
8. Dean of Graduate (cnewsome@skymail.csus.edu)
9. Catalog Editor (catalog@csus.edu)
10. Registrar's Office (k.mcfarland@csus.edu)
11. PeopleSoft (PeopleSoft@csus.edu)

Approval Path

1. Fri, 13 Sep 2024 20:14:13 GMT
Mikkel Jensen (mikkel.jensen): Approved for PHYS Committee Chair
2. Fri, 13 Sep 2024 20:15:10 GMT
William DeGraffenreid (degraff): Approved for PHYS Chair
3. Wed, 02 Oct 2024 23:40:14 GMT
Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
4. Fri, 11 Oct 2024 18:35:42 GMT
Chris Taylor (ctaylor): Approved for NSM Dean

New Course Proposal

Date Submitted: Wed, 11 Sep 2024 16:28:37 GMT

Viewing: PHYS 242 : Advanced Solid State Physics

Last edit: Wed, 02 Oct 2024 23:39:19 GMT

Changes proposed by: Rodolfo Barniol Duran (219696192)

Contact(s):

Name (First Last)	Email	Phone 999-999-9999
Michael Ray	ray@csus.edu	916-278-6501
Rodolfo Barniol Duran	barniolduran@csus.edu	916-278-5827
Christopher Taylor	ctaylor@csus.edu	916-278-6518
Christopher Hodges	christopher.hodges@csus.edu	916-278-6518
Alexander Pettitt	pettitt@csus.edu	916-278-6362

Catalog Title:

Advanced Solid State Physics

Class Schedule Title:

Advanced Solid State 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 2025 (2025/2026 Catalog)

Subject Area: (prefix)

PHYS - Physics

Catalog Number: (course number)

242

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 prerequisites at registration?

No

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

Fall term only - odd 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:

Solid state physics is responsible for almost all of our modern technology. Specifically the development of semiconductors is central to the economy of California. Students completing this course will be prepared to make meaningful contributions to this important field.

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

Properties of crystalline solids, reciprocal lattice, lattice vibrations, thermal properties, electronic properties, energy bands, Fermi surface, dynamics of conduction electrons, magnetic and optical properties, semiconductors, layered structures, and superconductivity.

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

Course Note: (Note must be a single sentence; do not include field trip or fee course notations.)

1) Students can only complete for credit either PHYS 142 or PHYS 242; 2) PHYS 242 students will complete an additional research project beyond that expected of students in PHYS 142.

Does this course have prerequisites?

Yes

Prerequisite:

PHYS 106 and MATH 45, 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?

Yes

Please confirm that it complies with the Paired Courses Policy and enter the course with which it is paired:

PHYS 142

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	Describe the fundamental lattice types using lattice vectors and crystal planes	Quizzes, assigned problem sets, and in-class examinations.
2	Use the reciprocal lattice and x-ray diffraction to determine crystal structure.	Quizzes, assigned problem sets, and in-class examinations.
3	Describe the interactions between atomic nuclei in a solid and use them to determine the elastic properties of the material.	Quizzes, assigned problem sets, and in-class examinations.
4	Use the concept of phonons to calculate the thermodynamic properties of solids.	Quizzes, assigned problem sets, and in-class examinations.
5	Apply models of electron behavior in solids to calculate the thermodynamic properties of solids.	Quizzes, assigned problem sets, and in-class examinations.
6	Explain properties of semiconductors based on their electron behavior.	Quizzes, assigned problem sets, and in-class examinations.
7	Describe the behavior of solids in electric and magnetic fields (dielectrics, ferroelectrics, ferromagnetism and anti-ferromagnetism).	Quizzes, assigned problem sets, and in-class examinations.
8	Examine current issues in material physics using solid-state theories.	Students will present written and oral reports on a topic chosen in consultation with the instructor.

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

PHYS242 - SolidState.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?)

Yes

Has a corresponding Program Change been submitted to Workflow?

No

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

Programs:

MS in Physics

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
Information literacy

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: 14815