ASTR 254: ASTROPHYSICS

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)
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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 19:47:01 GMT
   Mikkel Jensen (mikkel.jensen): Approved for PHYS Committee Chair
2. Fri, 13 Sep 2024 19:59:18 GMT
   William DeGraffenreid (degraff): Approved for PHYS Chair
3. Wed, 02 Oct 2024 22:26:27 GMT
   Mikkel Jensen (mikkel.jensen): Rollback to Initiator
4. Fri, 31 Jan 2025 19:10:07 GMT
   Mikkel Jensen (mikkel.jensen): Approved for PHYS Committee Chair
5. Fri, 31 Jan 2025 19:38:30 GMT
   William DeGraffenreid (degraff): Approved for PHYS Chair
6. Thu, 06 Feb 2025 23:01:54 GMT
   Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
7. Wed, 19 Feb 2025 23:51:44 GMT
   Chris Taylor (ctaylor): Approved for NSM Dean

New Course Proposal

Date Submitted: Sat, 11 Jan 2025 01:21:16 GMT

Viewing: ASTR 254 : Astrophysics

Last edit: Sat, 11 Jan 2025 01:21:15 GMT

Changes proposed by: Rodolfo Barniol Duran (219696192)

Contact(s):

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Catalog Title:
Astrophysics

Class Schedule Title:
Astrophysics

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)
ASTR - Astronomy

Catalog Number: (course number)
254

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 - 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:
Astrophysics is a key elective component of any Master's physics program. The topic bridges a number of areas of physics and continues to be one of the more thought provoking and exciting areas in science to a general audience, with new advances continually being the focus of contemporary news articles. As such, understanding the science behind the astronomy is of great importance. The university has already heavily invested into the astronomical sciences through the construction of the planetarium, and so it is prudent to support this investment through higher level courses such as these.

Course Description: (Not to exceed 90 words and language should conform to catalog copy.)
Introduction to astrophysics at the graduate level. Topics include galactic and extragalactic X-ray and gamma-ray astronomy, radiative processes, measurement and signal analysis techniques for astrophysics and cosmology throughout the electromagnetic spectrum, extragalactic objects, their physical properties, origin, evolution, and distribution in space.

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 110 and PHYS 135, and one of the following: ASTR 131, ASTR 132, ASTR 150, 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	Specify the properties of a variety of complex astronomical objects ranging from planetary scales to the size of the observable universe.	Derive the approximate sizes, temperatures, masses, lifetimes, luminosities and abundances of different types of stars, galaxies and compact objects in pre-class assignments and quizzes.
2	Apply their prerequisite knowledge of physics (classical mechanics, statistical mechanics, electromagnetism, quantum mechanics and relativity) to explain the dynamics and structure of astrophysical phenomena.	Utilize the theories of Newtonian/Einsteinian gravity, Fermi-Dirac population statistics, Maxwell's electromagnetic wave theory, and Planck's model of radiation in astrophysical contexts in homework and exams.
3	Evaluate the utility of different astronomical observatories and discern the features of astronomical sources from their detected radiation.	Justify the best telescope facilities to observe a given astronomical object, and what data they would produce in graded homework.
4	Solve analytical problems regarding the structure, evolution, and formation history of a wide variety of astronomical objects (e.g., stars, compact objects and galaxies).	Use calculus-level physics to solve astrophysical problems involving equations of state, equations of motion, and radiative physics of stars, interstellar gas and compact objects in homework and exams.

5	Identify the various astronomical paradigm shifts that formed our current model of the Universe.	Criticize the evidence for and against the existence of dark matter, dark energy, the heliocentric Solar System, and the nature of spiral nebula/Milky Way in a class discussion.
6	Develop a working knowledge of the astrophysical literature.	Review recent, peer-reviewed, astronomical publications as a homework exercise.

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

ASTR 254_Astrophysics.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
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

Reviewer Comments:

Mikkel Jensen (mikkel.jensen) (Wed, 02 Oct 2024 22:26:27 GMT): Rollback: Update all assessment strategies to list the type of assessment (exams, homework, quizzes, etc.) for that LO. Change wording of course description to indicate "Introduction to astrophysics at the graduate level."

Key: 14814