

## Department of Astronomy and Planetary Science AST 496C — Capstone Experience in Astronomy Fall 2021

### Course Information

- Meeting Times & Location: MWF 12:40 — 1:30 pm, Riles, Rm 113
- Credit: 3 credit hours
- Instructor & Email: Dr. Lisa Chien
- Email: [Lisa.Chien@nau.edu](mailto:Lisa.Chien@nau.edu)
- Office Location: Bldg. 19, Rm. 311
- Office Hours: All through emails

### Course Prerequisites

AST 280, (AST 333W or PHY 333W), and Senior Status

### Course Description, Objectives, & Structure

This course is the culmination of the undergraduate program in the Department of Astronomy and Planetary Science. It aims to catalyze the transformation of senior students from classroom learners to active independent professionals. Students will learn valuable skills that are required for successful careers in either academia or industry. Students will participate in a proposal writing process that emulates the professional one so vital to a scientific career. They will synthesize cumulative knowledge acquired in their degree to identify outstanding unsolved questions that point to the next steps of progress at the forefront of space science. They will also articulate outstanding problems and research strategies in a manner that clearly communicates the logic and potential efficacy of their research strategy in a competitive environment. Oral and written presentations will be used to achieve the latter goal.

This course will be divided into two parts: The first part will focus on interview and professional development skills, including resume/CV preparation, interview skills, and professional discourse. The second part will focus on preparing and delivering conference presentations and writing research proposals. Regardless of the students' career path, these skills will be invaluable for landing a job, for collaborating with colleagues, and for career advancement.

AST 498C directly addresses the NAU Liberal Studies Program science and applied science distribution block within the fields of astronomy and planetary science. Students will bring together knowledge of physical and chemical processes relevant to theories about the origin, evolution, and properties of celestial bodies by carrying out a careful literature review of a chosen topic. They will formulate key scientific questions and pose hypothetical answers that are testable with astronomical observations, planetary space missions, and/or theoretical modeling and computational simulations. Students will thus participate directly in a textbook process of scientific method that is explicitly inherent in the Liberal Studies Essential Skills of Scientific Inquiry and Critical Thinking. In addition, students will demonstrate Essential Skills of Effective Writing and Oral Communication in the form of conference-style oral and poster presentations. Professional communication skills will be further exercised in the form of CV/resume preparation, conference etiquette, public speaking to scientific peers and in other

career-building projects.

**Student learning outcomes** that also demonstrate achievement in the Liberal Studies Program's science distribution block and with essential skills of *scientific inquiry* and *critical thinking* include the ability to:

1. Formulate a research question in astronomy or planetary science with a testable hypothesis and scientifically viable approach to a solution.
2. Describe the fundamental astrophysical, chemical, or geological background principles relevant to an answer of the research question.
3. Critically interpret and discuss peer-reviewed literature.
4. Articulate an experimental procedure for addressing the research question and testing a hypothesis

**Student learning outcomes** that also demonstrate achievement in the Liberal Studies Program's essential skills of *effective writing* and *oral presentation* include the ability to:

1. Clearly communicate and defend a proposal and scientific results in verbal, written, and visual formats at a level appropriate for scientific and non-scientific audiences.
2. Create effective poster and oral presentations for academic or professional conferences;
3. Practice critically important proposal writing skills in an effort to secure external funding; and
4. Demonstrate professionalism in all interactions as well as a positive and mature disposition.

This course aims to introduce students to the full range of academic and professional career options in the fields of astronomy and planetary science.

### **Required Materials & Technology**

No required course materials. Weekly reading materials will be provided to students via the course site on BbLearn.

### **Evaluation & Grading System**

Assessment	Deliverables	Points
Professionalism, Disposition, and Engagement	Attendance & one question per class	10
Assignments	9 exercises	90
Total		100

Classes missed	Effect on grade
≤ 3	None
4 — 6	Lowered by 5%
≥ 7	Lowered by 10%

Grade	Points
A	90 — 100
B	80 — 89
C	70 — 79
D	60 — 69
F	0 — 59

**Professionalism, Disposition, and Engagement:** As a culminating capstone experience, a large component of this class is to demonstrate effective communication and professionalism skills in addition to all of the other successes accomplished throughout your undergraduate career. Being engaged in class is not only important to your educational experience, but also to the experiences of your peers (i.e., future colleagues). As a result, professionalism, disposition, and engagement is a required and grade component of this course. This will satisfy the essential skills outlined in NAU's Liberal Studies Program, including *Effective Oral Communication*, *Scientific Inquiry*, and *Critical Thinking*.

**Assignments:** In-class exercises are designed to help students create and refine professional content, including resumes, curricula vitae, personal and research statements, and cover letters. Please discuss with the professor beforehand if you have to turn in late. This will satisfy the *Scientific Inquiry*, *Critical Thinking*, and *Effective Written and Oral Communication* skills foundational to NAU's Liberal Studies Program.

### Tentative Schedule

Week	Dates			Discussion Topics & Content	Assignments & Deliverables
	Mon	Wed	Fri		
1	8/23	8/25	8/27	Course introduction & overview discussions	None
2	8/30	9/1	9/3	<b>Professional resume:</b> CV & portfolios	1) Cover letter
3	-	9/8	9/10	<b>Conferences:</b> Professional and academic	Resume/CV/Portfolio: draft 2) Conference Abstract
4	9/13	9/15	9/17		3) Resume/CV/Portfolio
5	9/20	9/22	9/24	<b>Public presentations:</b> posters, oral, & online	Slides: draft
6	9/27	9/29	10/1		Poster: draft
7	10/4	10/6	10/8	<b>Diversity &amp; Inclusivity</b>	4) Slides <b>presentation</b> & peer reviews 5) Poster <b>presentation</b> & peer reviews
8	10/11	10/13	10/15	<b>Interviews:</b> Professional and academic	6) Mock interviews
9	10/18	10/20	10/22	<b>Scholarship/Award proposals</b>	
10	10/25	10/27	10/29	<b>Telescope/Mission/Instrument proposals</b>	7) Mock Telescope Allocation Committee (TAC)
11	11/1	11/3	11/5	<b>Research proposals:</b> effective practices	
12	11/8	11/10	11/12	<b>Research proposals:</b> presentations	Proposal: draft
13	11/15	11/17	11/19	<b>Proposals Review</b>	Proposal: figures & tables
14	11/22	11/24	-	<b>Academic career options:</b> programs, schools, & advisors	8) Proposal
15	11/29	12/1	12/3	<b>Other career options:</b> education, outreach, industries, & companies	9) Proposal <b>presentation</b> & peer reviews

## Respect for Diversity and Inclusivity

This capstone class is designed to be fully transparent, inclusive, and accessible to all students.

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you. I am NAU Safe Zone certified.

## COVID-19 REQUIREMENTS AND INFORMATION

Additional information about the University's response to COVID-19 is available from the **Jacks are Back!** web page located at <https://nau.edu/jacks-are-back>.

## University Policies

- [Academic Integrity Policy](#)

Simply two words— no tolerance. *All students* involved will receive zero points on that assignment or exam. If cheating/plagiarism continue, you will receive an F in the class and the Dean's office will be notified.

- [Student Institutional Excuses Policy](#)

Also see the new [Faculty Notification Request form](#) if you must miss classes.