

Department of Astronomy and Planetary Science AST 201: Introduction to Indigenous Astronomy Fall 2023

Credit/ Pre- or co-requisites

- 3 credit hours
- No pre- or co-requisites
- Fulfills Scientific Literacy— Physical, Life, Earth, and Space Sciences Knowledge Area and the Indigenous Peoples Diversity Perspectives in the General Studies Program

Mode of Instruction

We expect you to be fully **in-person** at the lectures and the lab section you signed up. **Attendance is REQUIRED for the labs** but not for the lecture classes (however highly recommended). We will use TopHat to make our large-enrollment lecture classes more interactive. **TopHat is required**, and there are questions for you to answer during the lecture classes.

Lectures

- **Meeting times:** MW 9:00-9:50, Liberal Arts, Rm 120
- **In-class** content includes: 1) lectures with slides mixed with Youtube videos, 2) TopHat questions, and 3) an online interactive astronomy apps called ClassAction (no installation required).
- **After-lecture** content includes: 1) reading assignments, 2) Reading Quiz for each Unit, 3) First Midterm, 4) Second Midterm, and 5) Final Exams all on Canvas.

Lab Contents

- **Indoor activities**, with or without online resources, requiring creative designs, qualitative analysis, and real-life applications
- **Outdoor observations** during class
- **Observations outside of class time** such as observing the solar activities, moon phases, or meteor showers

Lab Section Details

AST201-09	Mon 6:00 — 6:50 pm	Bio Sci, Rm 224
AST201-10	Mon 7:00 — 7:50 pm	Bio Sci, Rm 225
AST201-11	Tue 6:00 — 6:50 pm	Sci Annex, Rm 105
AST201-12	Tue 7:00 — 7:50 pm	Sci Annex, Rm 106
AST201-13	Wed 6:00 — 6:50 pm	Sci Annex, Rm 107
AST201-14	Wed 7:00 — 7:50 pm	Sci Annex, Rm 108
AST201-15	Thu 6:00 — 6:50 pm	Sci Annex, Rm 109
AST201-16	Thu 7:00 — 7:50 pm	Sci Annex, Rm 110

Contacts

Professor: Dr. Lisa Chien (Lisa.Chien@nau.edu)

- Email communications strongly preferred first, and please give me 24 hours to reply (emails sent to me between 4:30pm and 8:00am will have to wait until 8:00am for my response)
- Office Hours: MW 11am — 12pm, Thu 12:30 — 1:30pm
- Office: Bldg 19, Rm 225C (we can also set up a Zoom meeting)

Lab instructor: Schuyler Borges (srb558@nau.edu)

Need to Miss a Class?

- Lectures: Since attendance is not required, you do not need to contact Dr. Chien, unless you missed an assignment

- due. Please contact Dr. Chien ASAP to get an extension, but late policy (see below) may apply.
- Labs: For any reasons you will miss a lab, **you MUST contact your lab instructor ASAP**. You may attend another section in the same week to make up your lab. Otherwise, please work with your lab instructor closely.
 - More NAU help and policy: [NAU "Need to miss a class?" page](#)

Course Purpose

When we think of astronomy, we often think of western modern astronomy. However, Indigenous Peoples have been developing complex systems of understanding the heavens all around the world since before the development of modern astronomical thinking. The course will introduce ancient and living astronomies of native peoples and compare those systems with modern astronomy and planetary science. We will examine how Indigenous cultures reference the skies and how they integrate humans into the cosmos. We will examine the importance of worldview and how it affects a person's perception of the universe. The course will focus on observation-based astronomy and the use of technology in the study of Indigenous astronomy. It will also examine the use of cultural ethics in the study of space science and traditional native astronomy. The primary cultural focus will be on astronomies of the American Southwest.

Key themes that we will examine throughout the course are— **Valuing the diversity of human experience, Environmental consciousness, and Technology and its impact**. We will accomplish this by examining the astronomies of different Indigenous cultures, their connection to the environment, and the use of technology in the past and present-day study of astronomy. This course satisfies *Scientific Literacy— Physical, Life, Earth, and Space Sciences Knowledge Area and the Indigenous Peoples Diversity Perspectives*. This requirement will be addressed through the comparisons of (a) ancient and living astronomies of native peoples with western astronomy and modern advances in space science exploration and of (b) the cultural ethics of traditional native astronomy with those of modern space science. This course will address several of the General Studies skills— *Critical Thinking, Information Literacy, and the Essential Skills of Application(s) and Quantitative Reasoning*.

Course Student Learning Outcomes

This course has several objectives and learning outcomes that will be addressed during the lecture and in the assigned reading. By the end of the semester, students will be able to:

- SLO1.** Describe the role of diverse cultures in understanding the relationship of people to the universe we live in;
- SLO2.** Use critical reasoning to understand the ways of knowing and resulting narratives associated with indigenous cosmologies, cosmologies widely accepted in the western pre-scientific era, and those of modern science;
- SLO3.** Use knowledge gained from direct observation, critical thinking and technology-based observations and analyses to locate the moon, planets, and stars that are important to indigenous peoples and describe their cycles, phases, physical characteristics, and significance in diverse cultural settings;
- SLO4.** Learn how ancient and modern indigenous cultures often practiced observational astronomy in ways that resemble scientific practice;
- SLO5.** Evaluate how influences of inequality, power, and privilege— including systems of oppression— affect Indigenous and non-Indigenous perspectives and ideologies.

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

Required Materials & Technology

All reading materials and assessments are on Canvas course page. However, you need to have stable internet connection and reliable hardware in order to participate **in-class TopHat Questions**, and finish **online Reading Quizzes and Exams** outside of classroom. Intermittently throughout the semester, we will be using many [astronomy simulation animations](#) on the Astronomy Education at the University of Nebraska-Lincoln website, to enhance learning. It is to your understanding and **required** to answer TopHat Questions and Reading Quizzes on Canvas. In the lab, also learn to use another interactive planetarium website called [Stellarium Web](#).



- **FIRST STEP: Be sure to click on the link “Top Hat 1.3” on Canvas to get access!**
- Then make sure to use SSO login after the first time to login to TopHat directly

Assignments & Assessments

1. TopHat Questions

In each Section of each Unit in class, there is a small portion of questions based on the lectures. They are designed to increase interaction in class, and you can discuss with your classmates for most of the questions. They will be answered in

class. There are 11 Units, and there are 12 to 19 Points in each Unit. No TopHat Questions points are dropped, and total is 171 points. Check TopHat or the schedule constantly for **Monday 11:59pm dues**. **Late submissions are assessed 2 points off penalty per day for the whole Unit.**

2. Labs

Attendance is required for the labs. The Labs are designed to strengthen your understanding of lecture materials, and will provide the opportunity to investigate or relate to astronomical phenomena as many ancient cultures once did. Some Labs align with specific astronomical events and thus will **require time-sensitive participation or outdoor observations** (see schedule below or on Canvas). Labs will be posted on Canvas and usually will be **due at the beginning of the following lab meeting**. Completing all work during lab time is very much encouraged. **If you must miss your section, you MUST contact your instructor and attend another section to make it up. An absence is an additional 2 points deduction. Please work closely with your lab instructors.** There are 12 labs, and each is 10 points. The last week will be for an optional makeup lab. One lowest Lab score is dropped, so the total of Lab points counted are 110 points. **Late labs are assessed 2 points off penalty per day.**

3. Canvas Reading Quiz

Reading quizzes are posted on Canvas, which will test students' comprehension of the material covered in the assigned reading. You have 2 attempts, and the timer is set to 60 minutes. The highest grade is counted before the due date, and you can review the correct answers after the due date. There are 10 questions, and thus 10 points, in each quiz. One lowest Reading Quiz score is dropped, so total points are 100 points. Check Canvas course page or the schedule constantly for **Monday 11:59pm dues**. **Late submissions are assessed 2 points off penalty per day.**

4. Canvas Exams

The exams are all on Canvas with multiple choice questions, fill-in-the-blanks, matching, and sorting questions. All exams will be open for a week (including Sat and Sun), and will be closed at the due date/time listed below. If you encounter any technical difficulties during your exams, please contact Dr. Chien at Lisa.Chien@nau.edu immediately.

First Midterm Exam: due Friday, 10/6, 11:59pm | Unit 1 to 3, 43 points

Second Midterm Exam: due Friday 11/10, 11:59pm | Unit 4 to 7, 54 points

Final Exam: due Wed, 12/13, 11:59 pm | Unit 8 to 11, 62 points

Below is a summary of the Assignments and Assessments:

Category	Due (see schedule below)	Points Distribution	Points	Includes:
TopHat Question	Mondays	12-19 points each Unit	171	ALL Questions, NONE Dropped
Lab	Normally in 1 week	10 points each	110	1 Lowest Dropped
Canvas Reading Quiz	Mondays	10 points each	100	1 Lowest Dropped
Canvas First Midterm Exam	Due Friday, 10/6, 11:59pm	-	43	Unit 1 to 3 Materials
Canvas Second Midterm Exam	Due Friday, 11/10, 11:59pm	-	54	Unit 4 to 7 Materials
Canvas Final Exam	Due Wed, 12/13, 11:59pm	-	62	Unit 8 to 11 Materials
Total			540	

Grading System & Late Policy

Midterm Total Points (Unit 1-3, Lab 1-3, First Midterm Exam)	Midterm Grade	Total Points	Grade
132 or more	A	483 or more	A
118 — 131	B	429 — 482	B
103 — 117	C	375 — 428	C
88 — 102	D	321 — 374	D
0 — 87	F	0 — 320	F

Connection Issues and Late Submission Policy for all Assignments:

If you encounter any difficulties accessing any assignments on TopHat or Canvas, please first keep trying with different internet connections, browsers, or devices. If problems still exist and it is getting close to the due date, please email me as soon as you can and I will give you an extension for another 24 hours. **All late inquiries and submissions for that unit must be done before its exam is due.** For example, you cannot ask me to give you extensions for Unit 1, 2, or 3, if the First Midterm Exam is already due. Otherwise, the late penalties are

- **Canvas Exams: Count as 0 points**
- **TopHat Questions: 2 points per day for the whole Unit**
- **Canvas Reading Quiz: 2 points per day**
- **Labs: 2 points per day**

Respect for Diversity

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.

Class Tentative Schedule (Please check Canvas course page for most recent update)

Week	Date	Day	Unit	TopHat DUE	Reading Quiz DUE	AST201 Lab
1	8/28	M	Course Intro			#1: Connecting Western & Indigenous Astronomy 
	8/30	W	Unit 1: Connecting With the Sky			
2	9/4	M	No Class	-	-	NO LABS
	9/6	W				
3	9/11	M	Unit 2: Cultural History of Indigenous People in North & Central America	-	-	#2: Globe at Night 
	9/13	W				
4	9/18	M	Unit 3: Cosmogony and Cosmology in Native & Western Astronomies	Unit 1	Unit 1	#3: Equinox & Calendar (Fall Equinox: 9/22) 
	9/20	W				
5	9/25	M		Unit 2	Unit 2	#4: Origins of The World
	9/27	W	Unit 4: Celestial Sphere & Sidereal Motion			
6	10/2	M		Unit 3	Unit 3	#5: Moon Phases (Full Moon: 9/29, Last Q: 10/6) 
	10/4	W	Unit 5: Moon & the Lunar Cycle			
	10/6	F	Canvas First Midterm Exam DUE 11:59pm (Unit 1-3)			
7	10/9	M		-	-	#6: Figures in the Sky
	10/11	W				
8	10/16	M	Unit 6: Planets	Unit 4	Unit 4	#7: Maya and the Wondering Stars, I
	10/18	W				
9	10/23	M	Unit 7: Stars	Unit 5	Unit 5	#8: Maya and the Wondering Stars, II
	10/25	W				
10	10/30	M		Unit 6	Unit 6	#9: Polynesian Wayfinding, I
	11/1	W	Unit 8: Constellations			
11	11/6	M		Unit 7	Unit 7	#10: Polynesian Wayfinding, II 
	11/8	W				
	11/10	F	Canvas Second Midterm Exam DUE: Fri 11/10, 11:59pm (Unit 4-7)			
12	11/13	M	Unit 9: Sun & the Diurnal Cycle	-	-	#11: Stars and Time 
	11/15	W				
13	11/20	M		Unit 8	Unit 8	NO LABS
	11/22	W	No Class			
14	11/27	M	Unit 10: Seasons & the Annual Cycle	Unit 9	Unit 9	#12: The Winter Count
	11/29	W				
15	12/4	M	Unit 11: Comets, Asteroids & Meteors	Unit 10	Unit 10	#13: MAKE UP LAB (optional)
	12/6	W				
16	12/11	M		Unit 11	Unit 11	Canvas Final Exam DUE 11:59pm (Unit 8-11)
	12/13	W				

Academic Deadlines

- ADD/DROP deadline (without “W”): 9/7
- Last day to withdraw: 10/27

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>.

Syllabus Policy Statements

ACADEMIC INTEGRITY

NAU expects every student to firmly adhere to a strong ethical code of academic integrity in all their scholarly pursuits. The primary attributes of academic integrity are honesty, trustworthiness, fairness, and responsibility. As a student, you are expected to submit original work while giving proper credit to other people’s ideas or contributions. Acting with academic integrity means completing your assignments independently while truthfully acknowledging all sources of information, or collaboration with others when appropriate. When you submit your work, you are implicitly declaring that the work is your own. Academic integrity is expected not only during formal coursework, but in all your relationships or interactions that are connected to the educational enterprise. All forms of academic deceit such as plagiarism, cheating, collusion, falsification or fabrication of results or records, permitting your work to be submitted by another, or inappropriately recycling your own work from one class to another, constitute academic misconduct that may result in serious disciplinary consequences. All students and faculty members are responsible for reporting suspected instances of academic misconduct. All students are encouraged to complete NAU’s online academic integrity workshop available in the E-Learning Center and should review the full *Academic Integrity* policy available at <https://policy.nau.edu/policy/policy.aspx?num=100601>.

COPYRIGHT INFRINGEMENT

All lectures and course materials, including but not limited to exams, quizzes, study outlines, and similar materials are protected by copyright. These materials may not be shared, uploaded, distributed, reproduced, or publicly displayed without the express written permission of NAU. Sharing materials on websites such as Course Hero, Chegg, or related websites is considered copyright infringement subject to United States Copyright Law and a violation of NAU Student Code of Conduct. For additional information on ABOR policies relating to course materials, please refer to [ABOR Policy 6-908 A\(2\)\(5\)](#).

COURSE TIME COMMITMENT

Pursuant to Arizona Board of Regents guidance (ABOR Policy 2-224, *Academic Credit*), each unit of credit requires a minimum of 45 hours of work by students, including but not limited to, class time, preparation, homework, and studying. For example, for a 3-credit course a student should expect to work at least 8.5 hours each week in a 16-week session and a minimum of 33 hours per week for a 3-credit course in a 4-week session.

DISRUPTIVE BEHAVIOR

Membership in NAU’s academic community entails a special obligation to maintain class environments that are conducive to learning, whether instruction is taking place in the classroom, a laboratory or clinical setting, during course-related fieldwork, or online. Students have the obligation to engage in the educational process in a manner that does not interfere with normal class activities or violate the rights of others. Instructors have the authority and responsibility to address disruptive behavior that interferes with student learning, which can include the involuntary withdrawal of a student from a course with a grade of “W”. For additional information, see NAU’s *Disruptive Behavior in an Instructional Setting* policy at <https://nau.edu/university-policy-library/disruptive-behavior>.

NONDISCRIMINATION AND ANTI-HARASSMENT

NAU prohibits discrimination and harassment based on sex, gender, gender identity, race, color, age, national origin, religion, sexual orientation, disability, veteran status and genetic information. Certain consensual amorous or sexual relationships between faculty and students are also prohibited as set forth in the *Consensual Romantic and Sexual Relationships* policy. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU’s *Nondiscrimination and Anti-Harassment* policy. EAO also assists with religious accommodations. For additional information about nondiscrimination or anti-harassment or to file a complaint, contact EAO located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011, or by phone at 928-523-3312 (TTY: 928-523-1006), fax at 928-523-9977, email at equityandaccess@nau.edu, or visit the EAO website at <https://nau.edu/equity-and-access>.

TITLE IX

Title IX of the Education Amendments of 1972, as amended, protects individuals from discrimination based on sex in any educational program or activity operated by recipients of federal financial assistance. In accordance with Title IX, Northern Arizona University prohibits discrimination based on sex or gender in all its programs or activities. Sex discrimination includes sexual harassment, sexual assault, relationship violence, and stalking. NAU does not discriminate on the basis of sex in the education programs or activities that it operates, including in admission and employment. NAU is committed to providing an environment free from discrimination based on sex or gender and provides a number of supportive measures that assist students, faculty, and staff.

One may direct inquiries concerning the application of Title IX to either or both the Title IX Coordinator or the U.S. Department of Education, Assistant Secretary, Office of Civil Rights. You may contact the Title IX Coordinator in the Office for the Resolution of Sexual Misconduct by phone at 928-523-5434, by fax at 928-523-0640, or by email at titleix@nau.edu. In furtherance of its Title IX obligations, NAU promptly will investigate or equitably resolve all reports of sex or gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. The Office for the Resolution of Sexual Misconduct (ORSM): Title IX Institutional Compliance, Prevention & Response addresses matters that fall under the university's Sexual Misconduct policy. Additional important information and related resources, including how to request immediate help or confidential support following an act of sexual violence, is available at <https://in.nau.edu/title-ix>.

ACCESSIBILITY

Professional disability specialists are available at Disability Resources to facilitate a range of academic support services and accommodations for students with disabilities. If you have a documented disability, you can request assistance by contacting Disability Resources at 928-523-8773 (voice), 928-523-8747 (fax), or dr@nau.edu (e-mail). Once eligibility has been determined, students register with Disability Resources every semester to activate their approved accommodations. Although a student may request an accommodation at any time, it is best to initiate the application process at least four weeks before a student wishes to receive an accommodation. Students may begin the accommodation process by submitting a self-identification form online at <https://nau.edu/disability-resources/student-eligibility-process> or by contacting Disability Resources. The Director of Disability Resources, Jamie Axelrod, serves as NAU's Americans with Disabilities Act Coordinator and Section 504 Compliance Officer. He can be reached at jamie.axelrod@nau.edu.

RESPONSIBLE CONDUCT OF RESEARCH

Students who engage in research at NAU must receive appropriate Responsible Conduct of Research (RCR) training. This instruction is designed to help ensure proper awareness and application of well-established professional norms and ethical principles related to the performance of all scientific research activities. More information regarding RCR training is available at <https://nau.edu/research/compliance/research-integrity>.

MISCONDUCT IN RESEARCH

As noted, NAU expects every student to firmly adhere to a strong code of academic integrity in all their scholarly pursuits. This includes avoiding fabrication, falsification, or plagiarism when conducting research or reporting research results. Engaging in research misconduct may result in serious disciplinary consequences. Students must also report any suspected or actual instances of research misconduct of which they become aware. Allegations of research misconduct should be reported to your instructor or the University's Research Integrity Officer, Dr. David Faguy, who can be reached at david.faguy@nau.edu or 928-523-6117. More information about misconduct in research is available at <https://nau.edu/university-policy-library/misconduct-in-research>.

SENSITIVE COURSE MATERIALS

University education aims to expand student understanding and awareness. Thus, it necessarily involves engagement with a wide range of information, ideas, and creative representations. In their college studies, students can expect to encounter and to critically appraise materials that may differ from and perhaps challenge familiar understandings, ideas, and beliefs. Students are encouraged to discuss these matters with faculty.

“Education is the most powerful weapon which we can use to change the world.” — Nelson Mandela