

Department of Astronomy and Planetary Science AST 201: Introduction to Indigenous Astronomy Spring 2020

Meeting Times & Location

TTh 9:35 am to 10:50 am, Science Annex Rm 106

Credit/ Pre- or co-requisites

3 credit hours, no pre- or co-requisites

Mode of Instruction

Face-to-face. Most of class time will be lectures, with interactions with students through clickers and discussions in class.

Instructor Contact & Availability ([Contacts & Hours](#) on BBLearn)

Dr. Lisa Chien

Email: Lisa.Chien@nau.edu

Phone: 928-523-0422

Office: Bldg. 19, Rm. 311

Office Hours: **Mon 2-3 pm, Tue and Thur 11 am-12 pm**

Please email me your name and class (AST201). I much prefer email communications when it is outside of office hours, whether you like to schedule a different time to meet or for course questions. I will get back to you within 24 hrs.

Teaching Assistant ([Contacts & Hours](#) on BBLearn)

Mitchell Magnuson (mpm288@nau.edu)

Course Purpose & Student Learning Outcome

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 a **Cultural Understanding** Distribution Requirement and is designed to appeal to a broad audience. 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 liberal studies essential skills. It will focus on *Critical Thinking, Ethical Reasoning, Scientific Inquiry, and the Use of Technology.*

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:

1. describe the role of diverse cultures in understanding the relationship of man to the universe we live in.
2. 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.
3. 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.
4. learn how ancient and modern indigenous cultures often practiced observational astronomy in ways that resemble scientific practice.

Required Materials & Technology

Top Hat ([Top Hat Access](#) on BBLearn)



Click on the link on BBLearn, or go to our course website <https://app.tophat.com/e/783269> on your laptop, or download the app on your device. The code to join is **783269**. If you have purchased Top Hat already, either for this semester or one year subscription, no need to buy it again. Just join the course! If this is your first time, please signup and it is \$30 for this semester (or pay \$48 for one year).

Should you require assistance with Top Hat at any time, due to the fact that they require specific user information to troubleshoot these issues, please contact their Support Team directly by way of email (support@tophat.com), the in app support button, or by calling 1-888-663-5491.

Grading System

Assessment	Percentage	Grade	Score
Attendance & Participation	20%	A	89.5 – 100
Online Reading Quiz	10%	B	79.5 – 89.5
Exam 1	15%	C	69.5 – 79.5
Exam 2	15%	D	59.5 – 69.5
Final Exam	20%	F	0 – 59.5
SkyWatch Assignments	20%		

Assignments & Assessments

1. **Attendance & Class Participation (through Top Hat)**



We will use Top Hat as **attendance**, so please bring your device or laptop to every class! Please don't forget to charge your devices, and make sure it has connection to internet. Each attendance is 1 point. We will also have **discussion questions** using Top Hat throughout the class with various points assigned. Your Attendance & Participate score is calculated using the **TOTAL of all Top Hat points**, and is updated regularly on BBLearn.

MALFUNCTION/MAKE-UP POLICY:

- If you have malfunction or need assistance anytime in class, please write your name and answers on a piece of paper and hand it in at the end of class. However, I do take **1 POINT OFF** to be fair.
- If you have any documented reasons, I will exempt your points from that class.

- You can also attend any extra credit opportunities (see more detail below) to make up the points you missed in this category.

2. **Online Reading Quiz**

Reading quizzes will be posted on BBLearn, which will test students' comprehension of the material covered in the assigned reading. They will consist of 10-15 questions, and due at the completion of each learning unit. Each quiz will be posted a week before they are due, and must be completed by the deadline. **No quiz scores will be dropped.**

LATE/MAKE-UP POLICY:

- All the reading quizzes are on BBLearn, and each one is worth 30 points. If you are marked late, you will get **5 POINTS OFF. If it is due to technical difficulties, please provide proof and you will not get penalized.**
- If you have any documented reasons, please contact me to discuss extension of due.

3. **Exams**

Midterm Exam I : Feb 27, Unit 1—4

Midterm Exam II: Apr 16, Unit 5—9

Final Exam: May 5, Tuesday, 7:30—9:30 am

This course will consist of two non-cumulative mid-term exams and one cumulative final exam. The two mid-term exams will include multiple choice questions, single-answer and short essay questions, and quantitative calculations. The final exam will be cumulative and will be partly focused on the second half of the semester. The final will be multiple choice with some short answer questions.

ABSENCE POLICY:

If you have any documented reasons, please contact me as soon as you can to arrange alternative exams.

4. **Sky Watch Assignments**

The Sky Watch assignments are designed to strengthen your understanding of lecture materials, and will provide the opportunity to investigate key astronomical phenomena as many ancient cultures once did. Many of these assignments align with specific astronomical events and all assignments will **require time-sensitive outdoor observations outside of class time (see schedule below)**. I will use the **HIGHEST 4 Sky Watch Assignments** as your grade. If weather is not cooperating during assignments, I may change to highest 3 assignments for your grade.

WEATHER/MAKE-UP POLICY:

- All the submissions are on BBLearn, and each assignment is worth 50 points. If you are marked late, you will get **10 POINTS OFF. If it is due to technical difficulties, please provide proof and you will not get penalized.**
- If you missed any assignment due to local weather, please provide proof and you can be exempt from the assignment.
- You can also make up ONE assignment with a semester-review assignment (SW6, only by request) due the end of the semester.

To help you get used to sky viewing, here are some free (lite version), helpful and highly recommended apps/software (NOT required for the class). All these apps/software allow you to point your device to the sky, and displays and identifies objects right on your device!



SkyView— I recommend this one among the two below, since it overlays on what you see through your camera, and you can take a quick picture with labels on the sky!



Night Sky— This app has incredible visualization, and when you pinch or tap on the constellations or any objects, it takes you to a 3D view of the stars in space and shows you more than enough of information you want to know about the object.



Star Chart— It's simple and easy to use (without information overload), and when you tap on objects, it give you nice simple astronomical data about them.



stellarium.org— Stellarium is a free open source planetarium for your computer (which also has a web form: [stellarium-web.org/](http://stellarium-web.org) and a non-free app called Stellarium Mobile PLUS Sky Map). It shows a realistic sky in 3D, just like what you see with the naked eye, binoculars or a telescope.

Extra Credit Opportunities towards your Class Participation!

There are many opportunities outside of the classroom to participate in local night viewing events and learn more about our sky and relate to our course materials. There are no limits of how many times you go to these events or places. Besides what are listed below, new timely opportunities may be announced in class and posted on BBLearn. **If you attend any of the events or sites below, you can earn 10 points for each event towards your Class Participation!**

Please write a **brief summary** address the following: What did you attend and where did you go? What is the event about? Can you relate the event back to anything we've covered in class? If not, tell me something new that you learned and would be interesting to cover in the future classes. If you observed, what objects did you see and what did you learn about them? Was it an object that we talked about in class? Was it an object that indigenous people knew about?

★ NAU Campus Observatory Public Nights (free)

Our own NAU Campus Observatory (Bldg. 47; on San Francisco, behind Reilly Hall) is open to the public, free of charge, on clear **Friday nights from 7:30 pm – 10:00 pm**. The NAU Astronomy club runs the telescope and members will discuss the constellations, astronomical objects. It is a great chance to learn about the telescope on campus (even Apollo astronauts, including Buzz Aldrin, visited before)!

★ Flagstaff STEM Night 2020 (March 9, 5-7pm, free)



Flagstaff STEM City organization recognizes, celebrates and expands the tremendous human and capital assets in Science, Technology, Engineering and Math (STEM) that exist in Flagstaff. This event will be held at **NAU Sky Dome**.

★ Astronomy on Tap Flagstaff Events (Every 1st Thur each month, 6:30-8pm, free, age 21+ only)



Astronomy on Tap Flagstaff is free night of engaging science presentations from local astronomers, interactive trivia, and prizes! Topics range from telescopes to black holes and galaxies. These events take place at the **Southside Tavern** in downtown Flagstaff. There are also **Science on Tap** events, not necessarily astronomical, held at the Green Room on every 3rd Thur each month from 6:30-8pm that you can attend.

★ I ❤️ Pluto Festival (Feb 15& 18, \$20+)



This year is the 90th anniversary of the discovery of Pluto, right here at the Lowell Observatory in Flagstaff, by Clyde Tombaugh on Feb 18, 1930. To celebrate the anniversary, Lowell Observatory and the city will hold events on these two days. Check out the website for more information: iheartpluto.org.

★ Lowell Observatory Evening Programs (\$14 or \$20; see me or Dept. Office for coupons!)



Lowell Observatory at Mars Hill, Flagstaff offers a variety of events and night sky viewing programs **from 10am-10pm, Monday to Saturday, and 10am-5pm on Sunday**. There is a regular Meet An Astronomer event every Sat. night. You can find coupons from me, the Dept. Office, or in local newspapers, advertisements, websites). Visit: lowell.edu.

★ Meteor Crater (\$22)



The world's best preserved meteorite impact site on Earth, located near Winslow about one hour drive from Flagstaff. Meteor Crater is the spectacular result of a collision that rocked the American Southwest approximately 50,000 years ago with the energy of more than 20 million tons of TNT. Visit: meteorcrater.com.

★ Coconino Astronomical Society Events (free)



Every month there is a Saturday evening free talk, from 6:45-8pm by the Coconino Astronomical Society held at Lowell Observatory. Check out their calendar for events: www.coconinoastro.org/calendar.htm.

★ International Dark Sky Locations



Since the day you arrived in Flagstaff, you've probably heard that Flagstaff is the world's first International Dark Sky City, recognized by the International Dark Sky Association in 2001. There are more cities, locations, national parks etc that have been recognized, and many are located near us. Visit these locations and learn about them: www.flagstaffdarkskies.org and darksky.org.

★ Cultural Sites of Indigenous Peoples in the US



Examples include the following, but not limited to, Picture Canyon Natural and Cultural Preserve, Walnut Canyon National Monument, Wupatki/Sunset Crater National Monument, Grand Canyon National Park, Montezuma Castle National Monument (Camp Verde), Antelope Canyon, Chaco Cultural National Historical Park (NM), Mesa Verde National Park (CO) etc. Also see here for other National Park Service locations in US: www.nps.gov/articles/visit-indigenous-landscapes.htm

★ Any other Observatories, Science Museums, or Astronomy-related Facilities/Locations

There are a few public/private observatories in AZ as well as research facilities that are not mentioned above, such as USGS (US Geological Survey) near Buffalo Park, NOAO (National Optical Astronomy Observatory) down at Tucson, Kitt Peak Observatories near Tucson etc. If you get a chance during holidays or breaks, visit observatories or science museums! (Note: visiting Dark Sky Brewing Company, or Roswell UFO museum in NM, do not count, sorry...)

Class Tentative Schedule

Week	Dates	Topics	Sky Watch (4 out of 5)	Reading Quiz
1	1/14, 1/16	Unit 1: Connecting with the Sky	SW1: Globe at Night — Jan 16-25	QZ1
2	1/21, 1/23			
3	1/28, 1/30	Unit 2: Cultural History of Indigenous peoples in North America		QZ2
4	2/4, 2/6	Unit 3: Cosmogony and Cosmology in Native and Western Astronomy	SW2: Stars & Time — Feb 16-29	QZ3
5	2/11, 2/13			
6	2/17-2/21	Unit 4: Celestial Sphere and Sidereal Motion		QZ4
7	2/24-2/28	2/27 Midterm I: Unit 1—4		
8	3/2-3/6	Unit 5: Sun and the Diurnal Cycle		QZ5
9	3/9-3/13	Unit 6: Seasons and the Annual Cycle		QZ6
10	3/16-3/20	SPRING BREAK	SW3: Spring Equinox — Mar 19 & 20	-
11	3/23-3/27	Unit 7: Stars		QZ7
12	3/30-4/3	Unit 8: Constellations		QZ8
13	4/6-4/10	Unit 9: Moon and Lunar Cycles	SW4: Pink Moon — Apr 8	QZ9
14	4/13-4/17			
15	4/20-4/24	Unit 10: Comets and Meteors	SW5: Lyrids Meteor Shower — Apr 16-25 (peak: 4/22)	QZ10
16	4/27-5/1	Unit 11: Planets		QZ11
17	5/4-5/8	May 5 Final Exam: 7:30—9:30am		-

Academic Deadlines

- ADD/DROP deadline: Jan 23
- WITHDRAWAL deadline (without petition and fee): Mar 23

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

Academic Integrity Policy

Please read this section carefully as each student is required to understand and comply with all Academic Integrity rules and standards. Both NAU and this Department have standards which are written and referenced below.

- Passing other’s work off as your own (plagiarism) and cheating are not accepted at NAU and are absolutely not tolerated in this class. It is not the professor’s responsibility to attempt to describe and prohibit any and all forms of Academic Dishonesty. **It is your responsibility to uphold the highest ethical standards.** If you have any doubt or question about this policy, it is your responsibility to ask the professor in advance and to be clear about the answers and policies.
- If you are caught cheating or if any of your **assignments/exams are found suspiciously similar** (such as exact same wording on written responses— note, changing a few words or the order of certain words is still plagiarism!), **ALL** students involved will receive zero points on that assignment or exam. The bottom line: ***Do your own work and do not let others copy off of you.***
- Academic Dishonesty information will be given to the Dean of Students and a written copy of any such incident may be attached to your official NAU file. If cheating/plagiarism continue, you will receive F in the class and the Dean’s office will be notified. University Academic Integrity Policy can be found [here](#).

University Policies can be found at nau.edu/university-policies/.

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>.

COURSE TIME COMMITMENT

Pursuant to Arizona Board of Regents guidance (Academic Credit Policy 2-224), for every unit of credit, a student should expect, on average, to do a minimum of three hours of work per week, including but not limited to class time, preparation, homework, and studying.

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 breach the peace, 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 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, or veteran status. Due to potentially unethical consequences, certain consensual amorous or sexual relationships between faculty and students are also prohibited. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU’s Safe Working and Learning Environment (SWALE) policy. EAO also assists with religious accommodations. For additional information about SWALE 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 via the EAO website at <https://nau.edu/equity-and-access>.

TITLE IX

Title IX is the primary federal law that prohibits discrimination on the basis of sex or gender in educational programs or activities. Sex discrimination for this purpose includes sexual harassment, sexual assault or relationship violence, and stalking (including cyber-stalking). Title IX requires that universities appoint a “Title IX Coordinator” to monitor the institution’s compliance with this important civil rights law. NAU’s Title IX Coordinator is Pamela Heinonen, Director of the Equity and Access Office located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011. The Title IX Coordinator is

available to meet with any student to discuss any Title IX issue or concern. You may contact the Title IX Coordinator by phone at 928-523-3312 (TTY: 928-523-1006), by fax at 928-523-9977, or by email at pamela.heinonen@nau.edu. In furtherance of its Title IX obligations, NAU will promptly investigate and equitably resolve all reports of sex or gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. Additional important information about Title IX and related student resources, including how to request immediate help or confidential support following an act of sexual violence, is available at <http://nau.edu/equity-and-access/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), 928-523-6906 (TTY), 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.

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.