Course: AST181: Introduction to Observational Astronomy (Laboratory)
Department: Astronomy and Planetary Science
Pre/Co-requisite: AST180 or AST 180H
Term: Fall 2023
Section: AST181-002 (Tuesday)
Meeting time: 7:30 – 10:00 PM
Mode of Instruction: Face-to-Face
Meeting Location: Physical Sciences, Bldg. 19, Rm. 218
No. Course Credits: 1

Lab Instructor: Will Burris
Pronouns: he/him/his
e-mail: wab77@nau.edu (please include AST 181L and your section number in the subject line)
Availability: Typically responds to e-mail within 24 hours, might be longer on weekends.
Urgent matters: Emails with "URGENT AST181" in the subject line will be responded to asap.
Office Location: Bldg 19 room 323
Office Hours: Tues 11-1

Required Materials

- AST 181 Lab Manual (Provided as a PDF by me)
- Calculator
- Something to write with (A pen/pencil, tablet, or other device suitable for sketching things like the phase of the moon or constellations in the sky)
- Red light flashlight (when outside)
- A digital camera (like on your phone, tablet, or computer) or a scanner (like those in the Cline Library) if you wish to print pages to work on or sketch by hand since all materials must be submitted through Canvas.
    - The default Apple notes app has scanner capabilities
- Warm clothes when we are outside
- A can do attitude!!
    - Science is awesome, enjoy it!!

Course Description

This course serves as an introduction to observational astronomy. We will be concentrating on the night sky and will use the 0.5 m Barry Lutz Telescope (BLT) telescope when conditions permit (as in, the sky is clear); otherwise, we will focus on exploring the motions of astronomical objects and other key concepts. When paired with the three-hour lecture course, Astronomy 180, the pair of courses meets the four-hour laboratory science component for liberal studies. The thematic focus of this course is Technology and its Impact, since we will examine how the use of telescopes changes the way

we see the sky. The skills we will be concentrating on are the use of technology, specifically telescopes and/or computers; the logic of scientific inquiry, which is at the heart of each laboratory exercise; quantitative reasoning developed during your analysis of your observations; and spatial reasoning developed during studies of the celestial sphere and the motions of the sun and planets.

Course Objectives

After successful completion of this course, you will be able to:

(a) Point out the basic stars and constellations in the night sky.
(b) Use a telescope to examine planets and other bright objects.
(c) Sketch the daily and annual motions of the sun and other astronomical objects.
(d) Use a variety of computer programs to illustrate basic astronomical concepts.
(e) Use the method of scientific inquiry to explain observational phenomena.

Course Structure

Instruction for this course is scheduled to be carried out entirely in-person. This course provides the special opportunity to make use of the 0.5 meter Barry Lutz Telescope (BLT) research class telescope. This is outside. **DRESS WARM!!** This will enable you to get a better feel for modern observational astronomy. Some labs will ask you to go outside and interact with the night sky, such as for sketching the moon or constellations. Most labs are due the week they are assigned, while other labs may require more time to complete (such as to see all phases of the moon); your lab instructor will make these expectations clear for each lab. Your lab instructor will set up a way to inform you of the night's scheduled lab, whether indoors or outdoors, based on sky conditions.

Face-to-Face

Class is offered via face-to-face instruction. This underscores the importance of **open and early communication** between the instructor and the class, consisting of 1) Checking e-mail and Canvas before coming to lab in the event of last-minute announcements, and 2) Notifying your instructor as soon as possible if you may have been exposed to COVID-19 or if there are any other reasons you will not be able to attend class.

Lab Ordering

This course requires students to purchase a lab manual with numbered labs. The nature of astronomy means that we are at the mercy of the weather, so the labs may appear out of order from what your friends in other lab sections are doing.

Lab Reports

Virtually all lab projects will involve lab reports. Some of these may be filled out entirely in Canvas, while others will ask you to submit your report electronically. For this course all lab reports come with templates in one form or another. Ideally the lab reports should be turned in at the end of the lab period; however, if you need extra time, you may turn them in as late as the start of the next lab meeting (the Tuesday following) that lab project. There will be some lab assignments given as take-home projects; these are to be completed outside of class and turned in by the date directed. All labs must be turned in to Canvas, so if you are working by hand, please plan to digitize your work accordingly (e.g., by taking pictures or filling in the pdf later).

Quizzes
Typically, there will be a weekly quiz on the material covered in the previous week's lab. Each quiz will consist of one or two short essay questions on the most important concepts. The goal of the quizzes is to test that you understand the material so be sure to ask questions during the lab if any concepts are unclear.

Term Project
Thorough details on the term project will be given later in the semester.

Participation
Participation points will be given for ongoing engagement with the course material during lab or outside of class. There will be many opportunities to earn participation points, including asking questions during lab, or via email or answering questions asked by your instructor or peers during the lab. An easy way to earn participation points is to come prepared to lab (e.g. by reading Canvas announcements and downloading / reading the lab before class). For example, tell me your favorite planet during the first lab section to show you read the syllabus and earn your first participation point. For full points, participate at least once in most lab weeks.

Grading System
Your total grade is weighted as follows:

Lab Reports	60%
Weekly Quizzes	15%
Term Project	15%
Participation	10%
Total	**100%**

In addition, your lowest lab grade and lowest quiz grade will be dropped from the final calculation.

Late Policy
Most labs in this course can be completed during class time and would be due at the end of lab under ordinary circumstances. Due to current circumstances, there will be an automatic grace period applied to all in-class labs which can be turned in without penalty until the start of the next lab meeting. If the lab is not turned in at that point, labs are considered late and accrue a 10% penalty each day at 5 PM until the following Tuesday. Thus, labs not completed within 2 weeks of the assignment being handed out are considered missed and will record a grade of 0. Take-home projects (e.g. Moon phases lab) have firm deadlines and will similarly accrue daily late penalties after the stated deadline at 10% per day until the 5th day when the grade will be set to 0.

No-question Extensions
Two (2) times during the term, you may turn in a lab up to 1 week late with no penalty and no questions asked (however, you cannot apply both extensions to the same lab). To do so, email the instructor within one week of the lab date to indicate you are using your extension. The lab will then be due the following Tuesday at the start of the lab and late penalties begin as normal thereafter. No-question extensions cannot be applied to quizzes or the term project.

Missed Labs and Make-ups

Because telescope labs are completed in real time, there will be no make-up BLT laboratories. Notify your instructor as early as possible if you know you will miss a lab because it may be possible to make it up during another section. Medical reasons for missing labs will be treated on a case-by-case basis at the discretion of your instructor. If you have an institutional excuse for missing a lab/quiz that cannot be made up, the instructor will substitute the average of all your other lab/quiz grades for that lab. Please note that being ill does not constitute an institutional excuse. An institutional excuse is one that has been signed by the Dean of a college for academic reasons, or by the Dean of students for a non-academic reason.

Tentative Schedule

Below is a tentative schedule for the class. Remember that labs may be delayed due to weather so the actual lab order may differ from this list and from your peers in other sections. Be sure to check your email and Canvas before coming to lab because weather conditions can change quickly.

Week	Dates	Lab
1	8/28-9/1	Lab 1: The Size of Astronomy
2	9/4-9/8	No Lab (Labor Day)
3	9/11-9/15	Lab 2: The Celestial Sphere
4	9/18-9/22	Lab 3: Finding Things in The Sky
5	9/25-9/29	Lab 4: Constellations
6	10/2-10/6	Lab 5: The Motion of the Moon Through Constellations
7	10/9-10/13	Lab 6: Intro to the Barry Lutz Telescope
8	10/16-10/20	Lab 7: Deep Sky Objects
9	10/23-10/27	Lab 8: Angular Measurement
10	10/30-11/3	lab 9: Telescopic Observations of Lunar Surface
11	11/6-11/10	lab 10: Galactic Structure
12	11/13-11/17	Lab 11: Reasons for Seasons
13	11/20-11/24	No Lab (Thanksgiving)
14	11/27-12/1	Term Project
15	12/4-12/8	Term Project

COVID-19 Requirements and Information

The following statements in red set forth in this document's first section are specific to NAU's response to the COVID-19 situation. The requirements outlined below are mandatory until further notice. They are based upon current public health conditions and guidance and may change as circumstances warrant or new information becomes available. 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/lumberjack-responsibilities.

FACE COVERING AND PHYSICAL DISTANCING REQUIREMENTS

Appropriate face masks or other suitable face coverings must be worn by all individuals when present in classrooms, laboratories, studios, and other dedicated educational spaces. To maximize the benefits of physical distancing as an important strategy to help reduce community transmission of the SARS-CoV-2 virus, instructors may implement mandatory student seating arrangements or specific seat assignments. Instructors may remove students who do not cooperate with these requirements from the instructional space in the absence of an approved accommodation arranged through Disability Resources. Failing to comply with these requirements may constitute a violation of the university's *Disruptive Behavior in an Instructional Setting* policy available at https://nau.edu/university-policy-library/disruptive-behavior.

USE NAUFLEX TO HELP MAINTAIN PHYSICAL DISTANCING

NAUFlex (available at https://nau.edu/nauflex/student) is designed to help all students actively participate in their coursework during the required day and time of a course when they are not physically present in the classroom. This course design model allows students to be fully engaged with faculty and peers and receive the high-quality educational experience for which NAU is known.

CLASS SESSION RECORDINGS FOR STUDENTS AND FACULTY USE ONLY

Certain class sessions may be audio or video recorded to help reinforce live instruction during the COVID-19 pandemic. These recordings are for the sole use of the instructor and students enrolled in the course. Recordings will be stored in approved, accessible repositories. By enrolling, students agree to have their image and classroom statements recorded for this purpose, to respect the privacy of their fellow students, and university-owned intellectual property (including, but not limited to, all course materials) by not sharing recordings from their courses. Questions regarding restrictions on the use of classroom audio or video recordings may be addressed to the appropriate academic unit administrator.

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.

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 conductive 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, or veteran status. Due to potentially unethical consequences, 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 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 Elyce C. Morris. 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 928-523-3515, by fax at 928-523-0640, or by email at elyce.morris@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 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), 928-523-6906 (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.

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.

Last revised January 6, 2021