AST 184L: Life in the Universe Lab
Spring 2025 Syllabus

College of the Environment, Forestry, & Natural Sciences
Department of Astronomy and Planetary Science

Semester: Spring 2025
Prerequisites: None
Co-requisites: AST 183
Location: Biological Sciences (Bldg. 21), Rm. 224
Meeting Times: 6:30-9:00 pm, Tuesdays
Mode of Instruction: In person

Instructor: Jude Ekow Gyesi
Email: jeg469@nau.edu
Office Location: *By appointment
Office Hours: *By appointment

Career Ready Resources.
LinkedIn:
CEFNS Career Development
www.linkedin.com/in/cefns-career-development-072715233
NAU Career Development
https://www.linkedin.com/company/nau-career-development/
Handshake:
https://nau.joinhandshake.com/login
Udemy: Online courses and career searching advice
https://in.nau.edu/its/udemy/
Log in with your NAU email account and search 'NAU Career Steps'
O*net Online: Occupation exploration reports
https://www.onetonline.org/

Note: the information in this document is subject to change *without notice* and any information provided verbally by your instructor supersedes that in this document (with the exception of official NAU policy)

Course Purpose: This one-credit laboratory course that complements the lecture course AST 183: Life in the Universe, a multidisciplinary exploration of modern scientific inquiry into the question of **life's origin, evolution, and future place in the Universe.** This course uses the exceptional environment of Northern Arizona (including its dark skies, world class rock exposures, meteor impact record, volcanic terrain, and nearby Mars-analog environments) as a unique laboratory wherein students will have direct contact with the kinds of data used to draw diverse astrobiological conclusions. **This lab course will also include two *mandatory*, all-day field trips to occur on two Saturdays, one to *Meteor Crater* and one to Grand Canyon National Park.**

Course Learning Outcomes: This lab will supplement the information learned in the Life in the Universe lecture course (AST183). **We will discuss topics related to both the concept and actual practice of searching for life in the universe.**

Specific topics will include:
1) The astronomical setting for life as we know it.
2) Nearby stars/planets and the prospects for life.
3) The evidence used to construct our picture of the history of complex life on Earth.

Assessments (grading weights): Assessments will be in the form of
i) lab reports,

ii) Field trip reports, and
iii) End of the semester project.

i) Lab Reports: Virtually all labs will involve lab reports. The lab reports should be turned in at the end of the lab period or at the start of the class session the following week. Field lab assignments may be given as take-home projects; these are to be completed outside of class and turned in as directed.

ii) *Lab Follow-Up and Surveys*: Most labs, including field trips, will be followed by an online survey, quiz, or assignment. These assignments are mandatory and may account for up to 25% of the value of the corresponding lab.

iii) *End of Semester Project*: You will spend the last several class sessions working on a project that should synthesize your knowledge gained throughout the semester. More information will be provided during the class.

Late Policy: Any assignments turned in after the due date will have 10% of the points deducted and an additional 10% deducted for each *additional day* the assignment is missing past the due date.

Student Learning Outcomes (SLO):
The students will be able to:
1) Describe the conditions necessary for life on a planetary body.
2) Explain the basic principles of taxonomic classification and biological evolution.
2) Compare and contrast different methods used in the search for extraterrestrial life.
3) Communicate their opinion on the likelihood of extraterrestrial life and why.

100% Career Ready:
One of the primary goals of this course is to provide skills that are in-demand from STEM employers to help NAU CEFNS students pursue careers of confidence and lives of purpose. Below is a list of in-demand skills from the National Association of Colleges and Employers (NACE) that students may be able to practice in this course:

1. Career & Self-Development: Proactively develop oneself and one's career through continual personal and professional learning, awareness of one's strengths and weaknesses, navigation of career opportunities, and networking to build relationships within and without one's organization.
2. Communication: Clearly and effectively exchange information, ideas, facts, and perspectives with persons inside and outside of an organization.
3. Critical Thinking: Identify and respond to needs based upon an understanding of situational context and logical analysis of relevant information.
4. Equity & Inclusion: Demonstrate the awareness, attitude, knowledge, and skills required to equitably engage and include people from different local and global cultures. Engage in anti-racist practices that actively challenge the systems, structures, and policies of racism.
5. Leadership: Recognize and capitalize on personal and team strengths to achieve organizational goals.
6. Professionalism: Knowing work environments differ greatly, understand and demonstrate effective work habits, and act in the interest of the larger community and workplace.
7. Teamwork: Build and maintain collaborative relationships to work effectively toward common goals, while appreciating diverse viewpoints and shared responsibilities.
8. Technology: Understand and leverage technologies ethically to enhance efficiencies, complete tasks, and accomplish goals.

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Specific student learning outcomes and career competencies practiced:[SR1]

- Engage (*i.e.*, read, discuss, study, communicate) in diverse physiological topics, as outlined below (*Critical thinking, communication, career and self-development*)
- Work in teams on real-world physiology case studies, taking on both leadership and team-player roles (*Equity and Inclusion, Leadership, teamwork*)
- Communicate ideas and opinions to a diverse student-group (*Communication, equity and inclusion, professionalism*)
- Practice technical science writing on all assignments (Communication)
- Network with diverse physiology professionals (Career and self-development, professionalism)

Grading System:

Classroom Lab Reports & Assignments	*50%*
Field Trip Lab Reports & Assignments	*25%*
Final Project	*25%*
Total	***100%***

Grading Scale:

89.5-100% → A
79.5-89.49% → B
69.5-79.49% → C
59.5-69.49% → D
≤ 59.49% → F

Attendance: Attendance of the lab is mandatory unless excused with proof of an extenuating circumstance (a doctor's note, an image of a positive COVID test with a time stamp, an emergency confirmation note written by a third-party individual, etc.).

Please be ready to learn by the start of the lab each week. Students must attend the section for which they are registered. Except in cases of an excused absence, documented through the dean of students or proper university channels, **missed labs cannot be made up and will be given a grade of zero**.

Readings: There are no assigned readings, unless you are making up an assignment.

Materials: Please bring a note-taking device (notebook, iPad, laptop, etc.) and a writing utensil. Scientific calculators are recommended (scientific calculator phone apps are okay). Laptops may be required for some assignments–if needed, you can rent a laptop from the campus library via the following link: https://nau.edu/library/laptops-equipment/

Field trip materials: You will also be required to complete an assignment while on the field trip, so you should bring a clipboard and writing utensils. The field trips will involve extensive (but not strenuous) walking on uneven terrain and may be carried out during inclement weather (e.g., rain/snow). As such, you should plan to wear sturdy shoes (e.g., hiking boots) and bring appropriate clothing (e.g., light/heavy jackets, hats, sunscreen) and supplies (e.g., water, food). If you do not have access to appropriate clothing or supplies, speak with your instructor to determine the best course of action.

COURSE SCHEDULE / SUBJECT TO CHANGE

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Week	Week of	Laboratory Exercise
1	Jan 14	Course Introduction / Syllabus
2	Jan 21	Lab 1: Microbiology / The Origins of Life
3	Jan 28	Lab 2: Evolution
4	Feb 4	Lab 3: Mass Extinctions
5	Feb 11	Lab 4: Rock Identification
6	Feb 18	Lab 5: Fossils
7	Feb 25	Lab 6: Outer planets and moons
8	Mar 4	Lab 7: Exploring Mars
8	Mar 11	Spring Break
9	Mar 22	Field Trip #1: Meteor Crater & Sunset Crater
10	Mar 25	Lab 8: The Size of Astronomy
11	Apr 1	MAKEUP LAB (for unexpected lab cancellations)
12	Apr 12	Field Trip #2: Grand Canyon National Park
13	Apr 15	Final project
14	Apr 22	Final project presentations
15	April 29	Final project presentations
16	May 6	FINALS WEEK no lab! :)

CLASS POLICIES

Behavioral Standards of Conduct: Please silence cell phones before class. Laptops, tablets, and/or phones may be used for class purposes (e.g., taking notes) *only*. Using devices for non-class purposes is distracting to students around you, and creating such disruption to the class learning environment is selfish and unacceptable. If devices are used in ways that are disruptive, the privilege of using them will be revoked (i.e., they will no longer be allowed) for those abusing the privilege.

Extensive research demonstrates that *the human brain cannot multitask*. Our focus simply shifts back and forth from one task to the other, a switching process that takes time, and so we are less efficient at both tasks, and our brains get worse at switching the more we try to do it. In other words, it is not physically possible to both pay attention to lecture and do something else on your device. Your learning and understanding will be diminished.

In the case of unsafe, inappropriate, disrespectful, or disruptive behavior, the instructor will dismiss you from the classroom after a verbal warning is given. If a student is asked to leave they will be given a zero for that assignment and the lecture course instructor will be notified.

Academic Standards of Conduct: Although the lab environment encourages group discussion, students must complete, and turn in, their own work. Cheating of any kind is not allowed and includes: exchanging answers with other students (in and out of lab), showing up to lab with work already completed, using unapproved resources during lab, plagiarizing, or other activities listed in the Academic Integrity policy (https://policy.nau.edu/policy/policy.aspx?num=100601/). Failure to comply with the code of conduct will result in immediate disciplinary action, which can include: being given a zero on an assignment, suspension, or an "F" in the course.

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://www9.nau.edu/policies/Client/Details/1443?whoIsLooking=Students&pertainsTo=All

ARTIFICIAL INTELLIGENCE: Artificial intelligence (AI) technologies bring both opportunities and challenges. Ensuring honesty in academic work creates a culture of integrity and expectations of ethical behavior. The use of these technologies can depend on the instructional setting, varying by faculty member, program, course, and assignment. Please refer to course policies, any additional course-specific guidelines in the syllabus, or communicate with the instructor to understand expectations. NAU recognizes the role that these technologies will play in the current and future careers of our graduates and expects students to practice responsible and ethical use of AI technologies to assist with learning within the confines of course policies.

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 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, 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. To report a concern related to possible unlawful discrimination or harassment or to request a time to meet, please use the Report an Issue Form. To file a complaint, please submit the online Complaint Form. EAO also assists with religious accommodations. To request a religious accommodation, please use the Religious Accommodation Request Intake Form. EAO additionally provides access to lactation spaces, and please use to the Lactation Space Request Form to request use of a location. For additional information about nondiscrimination or anti-harassment, contact EAO at EquityandAccess@nau.edu, or visit the EAO website at https://nau.edu/equity-and-access. The EAO is located in Old Main on the first floor.

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 employees, and covered guests.

One may direct inquiries concerning the application of Title IX to either or both the university Title IX Coordinator or the U.S. Department of Education, Assistant Secretary, Office of Civil Rights. You may contact NAU's Title IX Coordinator at titleix@nau.edu or by phone at 928-523-5434 . In furtherance of its Title IX obligations, NAU promptly will investigate or equitably resolve all reports of sex/gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. To submit a report, please use the File a Report Form. 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. ORSM also facilitates reasonable modifications for pregnant or parenting individuals. Additional important information and related resources, including how to request help or confidential support following conduct covered by the Sexual Misconduct Policy, is available on the ORSM web site, and you also may contact the office at titleix@nau.edu. The ORSM is located in Gammage on the third floor.

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, Scott Pryor, who can be reached at scott.pryor@nau.edu or 928-523-5927. 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.