

Syllabus: AST 482: Exoplanetary Science Capstone

Course Title: AST 482: Exoplanetary Science Capstone

Semester: Fall 2024

Instructor: Dr. Linda Nguyen

Email: lnguyen@asu.edu

Office: SANCA 380C, The Polytechnic School, ASU

Office Phone: (480) 727-7000

Office Hours: Fridays 2:00-4:30 PM OR by appointment

Class Time & Place: Wednesday or Friday 3:00-4:15 PM in SANCA 385

Course Description:

This capstone course focuses on the detection and characterization of exoplanets. Students will analyze data from telescopes to detect exoplanets and characterize their properties, culminating in a presentation of their findings at the Innovation Showcase. The course includes the development of a project proposal, data collection, modeling, and a final report.

Course Objectives:

Detect and characterize exoplanets using observational data.

Develop models to understand exoplanetary atmospheres and compositions.

Compare observational data with theoretical predictions.

Effectively present the project at the Innovation Showcase.

Learning Outcomes:

Gain expertise in exoplanetary science and data analysis.

Develop practical skills in modeling and hypothesis testing.

Improve communication skills through written reports and presentations.

Enhance the ability to manage astronomy projects from conception to completion.

Group Project and Required Subtasks:

The group project for this course will involve the detection and characterization of exoplanets. The project will be broken down into the following subtasks:

1. **Project Proposal (Week 3):**

- Create a proposal detailing the objectives, the specific exoplanets or planetary systems being studied, and the anticipated outcomes. Include a timeline and assign roles to team members.

2. **Data Collection and Analysis (Weeks 4-6):**

- Collect data from space telescopes and ground-based observatories. Analyze the light curves and radial velocity data to detect exoplanets.

3. **Characterization and Modeling (Weeks 7-10):**

- Characterize the detected exoplanets by modeling their atmospheres, compositions, and potential habitability. Compare the models with observational data.

4. **Interpretation and Hypothesis Testing (Weeks 11-12):**

- Interpret the results of the data analysis and test hypotheses about the formation and evolution of exoplanets.

5. **Final Report and Presentation (Weeks 13-15):**

- Document the entire research process, including challenges, solutions, and outcomes in a final report.
- Prepare a presentation and poster for the Innovation Showcase that highlights the key aspects of the project.

Groups are expected to collaborate closely, meeting regularly to discuss progress and resolve any

issues. Instructor check-ins will be scheduled to provide guidance and feedback.

Evaluation:

Class meetings (5): 20 points

Individual meetings (3): 12 points

Project Proposal: 10 points

Data Collection and Analysis: 15 points

Characterization and Modeling: 18 points

Interpretation and Hypothesis Testing: 10 points

Final Report: 10 points

Presentation: 5 points

Poster: 10 points

Total: 100 points

Course Policies:

Attendance and Participation: Regular attendance and active participation are crucial for success in this course. Students are expected to attend all scheduled class meetings and individual sessions. If a student is unable to attend a class, they should inform the instructor in advance and arrange to complete any missed work.

Academic Integrity: All students must adhere to ASU's academic integrity policy. Any form of academic dishonesty, including plagiarism, will be reported and may result in severe penalties, including a failing grade for the course.

Accommodations: Students with disabilities or special needs should contact the ASU Disability Resource Center to arrange appropriate accommodations and notify the instructor as soon as possible.

Important Dates:

Class Week 1: Introductions & Project Brainstorming (Aug 26)

Individual Meeting #1: Discuss Ideas and Readings (Sep 4)

Class Week 2: Proposal Presentation & Group Feedback (Sep 18)

Individual Meeting #2: Proposal Feedback & Methods Discussion (Oct 2)

Class Week 3: Revised Proposal Presentation & CERTT Tour (Oct 23)

Individual Meeting #3: Data Analysis & Progress Review (Nov 13)

Class Week 4: Professional Development & Project Discussion (Nov 27)

Innovation Showcase: Final Presentations & Poster Display (Dec 6)