EPET 201
Exploration of the Solar System
Spring 2020
CRN 89309
T/R 10:30 – 11:45 AM in POST 544
Planetary Data Center

Contact information:
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Office Hours: by appointment

Course Materials:
At the beginning of the semester or a major instructional section all instructional materials will be posted on Laulima in the EPET 201 resources folder.

Website: Computer access is required for this course. Pre-class assignments and course material are posted on Laulima. Please check for pre-class assignments before the next class period in the Laulima Resources folder!

Description: EPET 201, Exploration of the Solar System, is an introductory course for the EPET certificate aimed at any science or engineering student interested in the history and technology behind Solar System exploration and the available resources on other planetary bodies. The course will introduce students to the diverse sets of robotic spacecrafts, rovers, and landers sent to explore the various planetary bodies in our Solar System over the past 50 years. Course topics will include suites of remote sensing instruments used to collect a variety of data, flight plans (fly-by, orbiter, or lander) of planetary missions, the engineering constraints imposed on spacecraft design for different thermal and radiation environments, and the scientific discoveries made by these missions.

Students will explore the history of space exploration, the key attributes of different planetary bodies in the Solar System (e.g., planetary environments, atmospheric conditions, planetary materials, and degree and types of geologic activity), and the basics of sensor design and operation. Another critical aspect of planetary exploration and missions is teamwork, in which students must learn to cooperate and work together to accomplish goals. In this course, students will work in small teams to design their own hypothetical missions to a planetary object of their choice and to develop both a detailed
understanding of an object in the Solar System as well as the spacecraft performance needed to investigate this body.

**Class contact hours:** The class period combines lecture and laboratory all in one. Each meeting is about 1.25 hours long to allow time for brief lectures, exercises, collaborating on projects, analyzing data, and testing hypotheses. We anticipate that some group project work will take place during the class period, but major work on projects needs to be completed outside class.

**Learning Objectives/Course Objectives**

**University-Level Learning Objectives**

The design and structure of the course delivers learning outcomes aligned with the University of Hawaiʻi Institutional Learning Objectives for Undergraduate Students. The course:

- Gives in depth experience in the conduct of scientific inquiry and research
- Engages students in continuous practice with critical and creative thinking
- Is structured around procedures of conducting research in Earth and planetary science
- Engages students through intensive interaction with instructors and peers by means of classroom activities and projects
- Directly cultivates the habits of scholarly inquiry and intellectual curiosity, including inquiry across disciplines

**Department-Level Learning Objectives**

- Students can explain the relevance of solar system exploration outcomes to human needs
- Students can apply knowledge of relevant research methods, and the supporting disciplines to solve real world problems
- Students use the scientific method to define, critically analyze, and solve a problem in solar system exploration
- Students can report solar system exploration knowledge in both oral presentations and written reports
- Students can evaluate, interpret, and summarize the basic principles of solar system science, and their context in relationship to other core sciences to explain complex phenomena

**Course-Level Student Learning Objectives:**

1. Explain how the Scientific Method works, apply it to evaluate good versus bad science, and to analyze and assess data and draw conclusions about the world
2. Develop a better understanding and appreciation for the world we live and our solar system.
3. Improve cooperation, communication, and teamwork skills by collaborating in writing, presenting, and displaying data to communicate your knowledge, analysis and synthesis of data and ideas, and assessment of what they mean.

**Topics**

Exact content and order of topics will depend on progress and student interest:

- Background on history of Solar System.
- Properties of terrestrial planets and their moons and asteroids
- Properties of the Jovian planets, icy bodies, and dwarf planets.
Science as a process.
Sensors for planetary exploration.
Engineering of spacecraft for planetary missions.
Designing planetary exploration missions.

**Homework**
Homework will count 20% toward your grade.

**Group Projects**
Two group projects will count a total of 80% of the total grade (of the 80%, project 1 will be 30% and project 2 will be 50%).

**Grading**
Grading is not curved and therefore everyone can potentially get an A. Grades are greatly weighed by the two group projects. Grading will be based on homework and each individual’s grades in the group projects.

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<thead>
<tr>
<th>Percentage</th>
<th>Activity</th>
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<tbody>
<tr>
<td>20%</td>
<td>Homework</td>
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<tr>
<td>30%</td>
<td>Individual’s Grade on Group Project 1</td>
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<tr>
<td>50%</td>
<td>Individual’s Grade on Group Project 2</td>
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**Letter grade breakdown:**
A- = 90 – 92%, A = 93 – 96%, A+ = 97 – 100%
B- = 80 – 82%, B = 83 – 86%, B+ = 87 – 89%
C- = 70 – 72%, C = 73 – 76%, C+ = 77 – 79%
D- = 60 – 62%, D = 63 – 66%, D+ = 67 – 69%
F = < 60%

**Grading of Group Projects**
Group project teams will vary for each project and group project teams will be established through class discussion led by the instructors.

Each group will work on and hand in one consensus-based write up per project. At the start of each project, a grading rubric will clearly establish how each project will be graded. Grading will vary slightly with each project, but in general, it will include the following considerations:

**Written Report (few pages)**
Problem or Question is clearly stated
Hypothesis is clearly stated
Hypothesis is testable
Materials and Methods or Procedure are appropriate to test hypothesis
Data analysis is thoroughly described
Data presentation is appropriate (numbers or graph or side-by-side images)
Conclusions drawn are supported by data: Is the hypothesis supported or contradicted by the data?
Bonus: If your hypothesis was supported, what predictions or further test of the hypothesis can you make? If contradicted, can you create a new testable hypothesis?

**Oral Report (10-15 minutes)**
All group members must participate in oral reporting. The presentation style must be clear and understandable. The presentation should be supported by the group’s research results.

**In-Group Participation**
Your group’s assessment of your participation in and contribution to each project will impact your individual project grade.

**Other Group Assessments**
Each group will also be provided an opportunity to give formative and summative assessment of the other group’s projects. These assessments will NOT formally count toward your grade. They are part of the process of learning what makes a good presentation of a science project as it adds another perspective. Your peers from other groups will likely give you helpful comments that will allow you to improve your presentation (both written and oral), which will allow your group to get a higher grade.

**Extra Credit**
Opportunities for extra credit will be announced during the semester.

**Your roles**
1. Please read this syllabus and keep a copy of it to refer to in future.
2. Come to learn and to share your particular knowledge, skills, and learning styles with the rest of us. Everyone has something to offer and something to receive.
3. Be respectful of other students, of their desire to learn, their learning process, and their time.
4. Come prepared by doing the pre-class assignment. Because the in-class period is long, pre-class assignments will usually be short.

**Teacher roles**
1. We will give you the same respect that we ask you to give to us and to the other students in the class.
2. We are your guides and advisors as you learn, but we cannot “mind meld” knowledge and understanding to you.
3. We want to see you learn and grow in this class and to take that learning and growth with you as you go on in your life, so we very much welcome your constructive comments on how to improve the class for future students – or for you if you love learning so much that you take it again with another team of teachers and different projects.

**Plagiarism**
You will be preparing short written reports and short oral presentations for each project. DO NOT JUST COPY text from the Internet or from a book without a citation. Put your findings in your own words. Plagiarized text in a group report will result in a grade reduction by 2 levels (e.g., grade drop from an A to a C) for the first occurrence. A second occurrence will result in a zero for that project.

**Other Resources**

**Disability Access:**
The Earth Science Department will make every effort to assist those with disability and related access needs. For confidential services, please contact the Office for Students with Disabilities (known as “KOKUA”) located in the Queen Liliʻuokalani Center for Student Services (Room 013): 956-7511, kokua@hawaii.edu, www.hawaii.edu/kokua

**Learning Assistance Center (LAC) is here to help students:**
- Use appropriate study skills to achieve academic goals.
- Learn how to adjust learning approaches to fit their individual learning needs.
- Learn how to study effectively with others.
- Use effective learning practices.
- Use self-reliant learning behaviors.
- Have a functional understanding of course content.

www.manoa.hawaii.edu/learning

**Gender-Based Discrimination or Violence**
University of Hawaiʻi is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources to support and assist you. Staff can also direct you to community resources. Here are some options:
- If you wish to speak with someone CONFIDENTIALLY, contact the confidential resources available here: http://www.manoa.hawaii.edu/titleix/resources.html#confidential
- If you wish to REPORT an incident of sex discrimination or gender-based violence, contact: Dee Uwono, Title IX Coordinator, Hawaiʻi Hall 124, t9uhm@hawaii.edu, (808) 956-2299
- As members of the University faculty, your instructors are required to immediately report any incident of potential sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and your instructors cannot guarantee confidentiality, you will still have options about how your case will be handled. Our goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.