Contact information:
Dr. Peter Englert: POST 508B, 808-384-3500, penglert@hawaii.edu
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Dr. Trevor Sorensen: POST 509C, 808-956-4715, sorensen@hsfl.hawaii.edu

Class contact hours:
M 1:30 – 4:00 PM in POST 544
W 1:30 – 4:00 PM in POST 544

Office Hours: by appointment

Course Description:
Develops a space mission with a multidisciplinary team of engineers and scientists using concurrent science and engineering methodologies. The class will build a small spacecraft and payload. The project will seek to answer important science questions.

Number of Credits:
EPET-ME 401 is a four-credit lecture/laboratory course.

Relation to Curriculum
EPET-ME 401 is an integral part of the Earth and Planetary Exploration Technology certificate.

Prerequisites:
EPET-ME 400

Class contact hours:
Two 3-hour meetings per semester week
Remote Compositional Analysis: Techniques for Understanding Spectroscopy, Mineralogy, and Geochemistry of Planetary Surfaces, Editors: Janice L. Bishop, Jeffrey E. Moersh, and James F. Bell, III. Publisher: Cambridge University, 2019.


Course Materials and Laulima Website: At the beginning of the semester or a major instructional section, instructional materials will be posted on Laulima in the EPET-ME 401 resources folder.

Course Structure: The course is structured into learning modules generally aligned with semester weeks. The lecture/laboratory course structure allows about 50% of instruction time for lectures and lecture activities and about 50% for laboratory activities and course project activities. EPET-ME 401 project activities focus on building a small spacecraft and payload.

Course Delivery:
The main elements of course delivery are mini-lectures, guided group discussions, and project-based learning activities. Students are engaged in studying foundational publications in the field of
planetary science and are asked to critically evaluate research design, data acquisition, and data analysis and research outcomes.

The laboratory component of the course is characterized by the integration of theory and practice. Learning objectives are integrated through and culminate in a group-based research project: the building of an instrument for a planetary exploration mission.

Class contact hours:
The class period, M 1:30 - 4:00 pm, and W 1:30 – 4:00 pm will be used for regular lectures, laboratories, and project work. You will be informed in advance about the detailed schedule via announcements on Laulima.

Learning Objectives/Course Objectives
University-Level Learning Objectives
The design and structure of the course delivers learning outcomes aligned with the University of Hawai‘i 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 space science instrumentation 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:
Principles of Spacecraft Design; Systems Integration & Design Convergence
Principles of orbital remote sensing; science payloads
Payload design, construction and testing
Grading

Homework Assignments: 20 %
Group/Class Project: 80 %

Grading Homework: 20%
Although the course does not involve many traditional homework problems, you will get an occasional assignment of problems to solve that will help you understand the course material.

Grading of Group/Class Projects
Group project teams will be established through class discussion led by the instructors. Each group will work on a small satellite with a remote sensing payload. Each member of the class will actively participate in a team project, which will cover the full life cycle of a space project, from conceptual design, through fabrication and limited testing, and culminating with the final presentation and report. Each student is assigned an area of responsibility for the class project. Each student must participate in the presentations of the Proposal, the Detailed Design Review, and the Final Report. The team must submit a professional project final report that clearly shows the contribution of each student. The student will also be graded on the level (quantity and quality) of participation as determined by the professor and his assistants.

Proposal: 10%
Performance (including demonstrated technical understanding) and participation during the oral presentation of the team proposal in response to the Request for Proposal (RFP). Each student’s contribution must be clearly indicated.

Detailed Design Review 20%
Performance (including demonstrated technical understanding) and participation during the oral presentation of the Detailed Design Review which is the GO/NO-GO decision point for building the vehicle. No written report is required.

Participation & Performance: 10%
Participation and performance of the class team working on the class project as documented by the professional report submitted by each student at the end of the semester and personal observations of the instructor and the team leader and/or teammates.

Final Report: 40%
The Final Project oral presentations will be graded under this category. A professional comprehensive Project Final Report must be produced and delivered with the participation and direct contribution of all students. There is no page limit. The contribution of each student to the Final Report must be clearly indicated.
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%

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

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 Lili’uokalani 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 Hawai‘i 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, Hawai‘i 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.