SYLLABUS

Department of Earth Sciences - ERTH 420/620

Fall 2023, Tuesday & Thursday 9:00-10:15am, POST 723

Instructor: Chip Fletcher
Contact information: fletcher@soest.hawaii.edu; 808-294-0386 (*text or call*)
Office location: POST 802
Office hours: T/Th 10:15-11am (basically after class, but I'll make an appointment to meet anytime if you contact me)

I. Catalog Course Description: Global and local aspects of climate change and paleoclimate; beach and reef processes and response to climate change; management of coastal environments; field study local sites. Repeatable one time. Junior standing or higher, or consent. (Cross-listed as SUST 427) DP

II. Course Assignments, Assessment and Grading

a. 3 exams, 25% ea.
b. Class projects/talks, 15%
c. Attendance mandatory, participation, 10%

III. Calendar – Course calendar and content may change.

Week of	**Weekly Topic**
a. Aug 21	Introduction, Global warming
b. Aug 28	OcnAtmo circulation
c. Sept 4	Pleistocene/Holocene
d. Sept 11	Heat/Food/Security
e. Sept 18	Biodiversity loss, Inequality
f. Sept 25	UNFCCC & IPCC
g. Oct 2	EXAM I (tentative)
h. Oct 9	Paleoclimate
i. Oct 16	Global isostasy
j. Oct 23	Reefs
k. Oct 30	Beaches
l. Nov 6	EXAM II (tentative)
m. Nov 13	Sea level rise
n. Nov 20	Pacific islands
o. Nov 27	Coastal management
p. Dec 4	Resiliency, Responses
q. Dec 7	EXAM III

IV. Course Information, Policies and Resources

a. **Attendance policy:** Attendance is mandatory.
b. **Participation:** Participation is mandatory.
c. **Electronic devices:** Not allowed during tests. Allowed during lecture for note-taking.
d. **Statement on Disability: KOKUA Program**:
If you have a disability and related access needs, please contact the KOKUA program (UH Disabled Student Services Office) at 956-7511, KOKUA@hawaii.edu, or go to Room 013 in the Queen Lili'uokalani Center for Student Services. Please know that I will work with you and KOKUA to meet your access needs.
e. **Academic Integrity and Ethical Behavior: Office of Judicial Affairs:**
Cheating, plagiarism, or other forms of academic dishonesty are not permitted within this course and are prohibited within the System-wide Student Conduct Code (EP 7.208). Examples include fabrication, facilitation, cheating, plagiarism, lying when caught cheating, and use of improper materials including cell phones, tablets, computers, or any electronic device during a test or other grading opportunity. Any incident of suspected academic dishonesty will be reported to the Office of Judicial Affairs (OJA) for review and possible adjudication. Additionally, the instructor may take action in regards to the grade for the deliverable or course as they see fit. OJA provides the following: In cases of suspected or admitted academic dishonesty, the instructor involved shall attempt to resolve the matter with the student. Actions may include allowing the student to redo the assignment or giving a failing or reduced grade for the course. Instructors are encouraged to bring the matter to the attention of the departmental chairperson and/or academic dean of the instructor's school or college, and provide an informational report to the Student Conduct Administrator. Additionally, an instructor may formally refer any case of academic dishonesty to the Student Conduct Administrator for action under the Student Conduct Code.

The Student Conduct Administrator or designee shall pursue such cases to determine appropriate disciplinary actions if, after a preliminary investigation, it is their determination that sufficient information exists to establish that an act of academic dishonesty took place.

f. **Office of Title IX** (see below)
g. **Department of Public Safety**: (808)956-6911 (Emergency) / (808)956-8211 (Non-Emergency) www.hawaii.edu/security

V. Course Content and Learning Objectives

a. **Course Content:** This course takes a deep dive into the cumulative impacts of climate change, and human use of Earth resources. We will see the results of the extractive model based on perpetual growth. Topics we discuss read like a list of how to *not* live on a planet when it is your only option for survival: industrial agriculture, habitat loss, biodiversity loss, emerging infectious disease, extreme weather, sea-level rise, pollution, greenhouse gas sources, UNFCCC, IPCC reports, natural climate change, paleoclimate, coastal processes, beach processes, coastal management, and geologic aspects of Hawaii's fringing reefs. We also delve into solutions. Over the course of the semester we will visit a range of topics that are tied, one way or another, to the massive changes that human practices of extractive resource use and growth economics have had on planet Earth.
b. **Mānoa Institutional Learning Objectives for Undergraduate Students:** Institutional Learning Objectives (ILOs) encompass the UH Mānoa undergraduate experience as a whole—academic and co-curricular. It is through the combined efforts of faculty, students, staff, and administrators that students achieve the ILOs.
    i. **Know—Breadth and Depth of Knowledge**
    Students develop their understanding of the world with emphasis on Hawai'i, Asia, and the Pacific by integrating general education knowledge (arts and humanities, biological sciences, languages, physical sciences, social sciences, technology); Specialized study in an academic field; and Understanding of Hawaiian culture and history.
    ii. **Do—Intellectual and Practical Skills**
    Students improve their abilities to think critically and creatively; Conduct research; and Communicate and report.
    iii. **Value—Personal and Social Responsibility**
    Students demonstrate excellence, integrity, and engagement through: Continuous learning and personal growth; Respect for people and cultures, in particular Hawaiian culture; Stewardship of the natural environment; and Civic participation in their communities.
c. **Department of Earth Sciences Learning Objectives for Undergraduate Students:** The Department of Earth Sciences has established the following undergraduate student learning objectives.
    i. Students can **explain the relevance** of Earth Sciences to human needs, including those appropriate to Hawai'i, and be able to discuss issues related to geology and its impact on society and planet Earth.
    ii. Students can **apply technical knowledge** of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.
    iii. Students **use the scientific method** to define, critically analyze, and solve a problem in earth science.
    iv. Students can **reconstruct, clearly and ethically**, geological knowledge in both oral presentations and written reports.
    v. Students can **evaluate, interpret, and summarize the basic principles** of Earth Science, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in geology and geophysics.

VI. Recommended Reading

a. Please read the Summary for Policy Makers (SPM) from each of the 4 segments of IPCC AR6
    i. Physical Science Basis: https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/
    ii. Impacts, Adaptation, Vulnerability: https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/
    iii. Mitigation: https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/

iv. Synthesis: https://www.ipcc.ch/report/sixth-assessment-report-cycle/

b. Honolulu Climate Change Commission
   i. Climate Change Brief (2023): https://resilientoahu.org/climate-change-commission/#guidance
   ii. Sea Level Rise Guidance (2023): https://resilientoahu.org/climate-change-commission/#guidance
   iii. Heat Guidance (2023): https://www.resilientoahu.org/climate-change-commission/#guidance
   iv. Shoreline Setback Guidance: https://www.resilientoahu.org/climate-change-commission/#guidance
c. UH-CRC Publications: https://www.soest.hawaii.edu/crc/index.php/publication/
   i. #77 Fletcher, C.H., *et al.* (2008) Geology of Hawaii Reefs. https://www.soest.hawaii.edu/crc/publications/GeologyofHawaiiReefs.pdf
   ii. #122 Anderson, T., *et al.* (2018) Modeling multiple sea level rise stresses. https://www.soest.hawaii.edu/crc/publications/Anderson_et_al_SciRep_2018_SLR_modeling.pdf
   iii. #121 Summers, A., *et al.* (2018) Failure to protect beaches under slowly rising sea level. https://link.springer.com/article/10.1007/s10584-018-2327-7
d. Fletcher (2010) Living on the Shores of Hawai‘i, UH Press: https://uhpress.hawaii.edu/product/living-on-the-shores-of-hawaii-natural-hazards-the-environment-and-our-communities/
e. Fletcher (2019) Climate Change, 2nd Edition: What the Science tells us: https://www.wiley.com/en-us/Climate+Change%3A+What+The+Science+Tells+Us%2C+2nd+Edition-p-9781119399391
f. Recommended Websites
   i. Carbon Brief: https://www.carbonbrief.org/
   ii. Real Climate: http://www.realclimate.org/
   iii. Yale Program on Climate Change Communication: http://climatecommunication.yale.edu/
   iv. Inside Climate News: https://insideclimatenews.org/