



**The Hawaii Program:
Marine Management and Conservation
Summer 2024
June 21 – July 5**

ACADEMIC SYLLABUS

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Contact Hours: We will be in close contact for the duration of the course, and there will be plenty of opportunities for students to meet with the faculty and TAs. Students are encouraged to engage with faculty and TAs to discuss assignments or any other personal issues or concerns as needed.

Class Meetings: The Wildlands Studies Program in Hawaii involves seven days per week of instruction and field research with little time off. Faculty and staff work directly with students 6-10+ hours a day and are available for tutorials and coursework discussion before and after scheduled activities. Typically, scheduled activities for the day will begin at 9 am, with breaks for meals; however, our day may begin much earlier or end late, so students need to have a flexible mindset while on the program. Scheduled activities will include a variety of things including but not limited to lectures, discussions, hikes, and field research. Students should also expect to spend a few hours a day studying, writing in their journals, and completing readings. It is necessary for students to have a flexible mindset and to be able to accommodate a variety of class, activity, and independent study times.

Course Credit: Students enrolled in this Wildlands Studies Program receive credit for one undergraduate course. This course has distinct objectives and descriptions, and we integrate teaching and learning through formal learning situations (lectures and seminars), field work, field surveys and hands-on activities. Academic credit is provided by Western Washington University. Extended descriptions follow in the course description section of this syllabus.

ESCI 437B, Environmental Field Survey (5 quarter units / 3.35 semester credits): Study and application of field surveys, sampling methodologies, data management, including on-site data collection, assessment, and analysis.

Readings: Students will be required to complete readings from a course reader. The course reader, including primary literature, excerpts, and technical reports, will be compiled and emailed to students in advance of the program. Students are encouraged to bring their own personal copy with them, and it is best to print it out (it's easiest to print it double sided and have it bound). You may also bring an electronic copy downloaded on a tablet/device; however, the opportunity to charge devices will not always be available so it is recommended that you bring a printed copy. Additional field guides and texts will be carried around in a shared reference library that will be used to supplement field activities and to use during group reading sessions.

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I. Program Overview

Prepare to explore awe-inspiring environments characterized by rugged coastlines, coral reefs, spectacular mountains, lush rainforests, lava fields, and geologically active terrain. Our Hawaii Program will take place in one of the most isolated island archipelagos on the planet, and a place where indigenous peoples have stewarded land and sea for many generations before western occupation. Hawaii, located over 2,000 miles southwest of the contiguous United States in the North Pacific Ocean, is one of the only locations on Earth where it is possible to witness physical and ecological development of island systems through active volcanism. Formed at the end of the Cretaceous Period approximately 70 million years ago, the Hawaiian archipelago is comprised of 132 islands, atolls, reefs, shallow banks, and seamounts that extend for over 1500 miles, providing sanctuaries for marine life, seabirds, and diverse species of plants.

Our field study will take us to the island of Hawaii, the youngest and largest of the Hawaiian Islands, aptly referred to as the Big Island. The Big Island is comprised of five separate shield volcanoes, each with unique environments rich in biodiversity, endemic species, varying climates, and conservation challenges. The south end of the island hosts Volcanoes National Park, a sanctuary of volcanic and geologic phenomena, including recent lava flows, rainforests, deep craters, lava deserts, remote beaches, and excitingly, Kilauea, one of the most active volcanoes on Earth. Soaring to a height of over 13,500 feet, Mauna Loa, the largest active volcano on the globe, sits on the northwest corner of the Big Island, and to the east is Mauna Kea, the highest mountain in Hawaii and home to an astronomical observatory, and often, snow!

The marine environment surrounding the Big Island is also unique, being a tropical coral reef ecosystem that is at a fairly high latitude. Home to intricate reef ecosystems that support an abundance of life, the Big Island is the perfect place to study tropical marine systems. From microscopic plankton to majestic manta rays and whales, Hawaii's marine life showcases some of the planet's most complex relationships and fascinating ecological adaptations.

Because the Hawaiian Islands are geographically isolated, the ecosystems on these islands are fragile. They face existing and emerging environmental stressors that threaten biodiversity. A rapidly changing environment highlights the importance of research and monitoring efforts so that long-term biological and physical trends can be determined. With a primary focus on marine systems, students on this program will become skilled at identifying key flora and fauna, examine geological features that characterize the landscape, and assist in research and conservation efforts. A particular emphasis will be placed on management and conservation of marine habitats, the impacts of climate change, the biological and physical processes that impact our planet's climate, the human dimension of conservation and management, and the interconnectedness of terrestrial and marine ecosystems. The program is guaranteed to provide students with a deep understanding of island ecosystems and climate change and approaches to solving complex, social-ecological challenges.

Team Activities & Program Itinerary

Our program will take place on the Kona (meaning leeward) coast, the less windy and dry side of the island. Rocky headlands, fringing reefs, sheltered coves, and black and white sand beaches provide premier sites to initiate our field studies. Hawaiian peoples have been stewarding the land and sea of the Hawaiian archipelago for over 1000 years, and Kona is rich with that history. We will learn about that history, and about ways the Hawaiians have managed their ecosystems. We will also touch on the global efforts to establish and manage large marine protected areas, including the Papahānaumokuākea Marine National Monument of the Northwestern Hawaiian Islands. Prepare to explore the coral reefs and contribute toward monitoring efforts.

The Hawaiian Islands have so much to offer. To experience as many sites as possible, we'll spend time traveling and use rental vehicles to make our way to our sites. Some sites require hiking to access, while others will be near where we park our cars. We will primarily reside in Miloli'i, on private property where we will camp in a rustic campground right on the Kona coast, with a port-a-potty, an outdoor cooking space, an outdoor shower (note that water is limited on the dry Kona coast so we will be sparing with water!!) and a small shelter. This program is guaranteed to provide unparalleled learning opportunities and the adventure of a lifetime.

II. Learning Objectives

Our overarching goal on this program is for students to learn key field research skills designed to support the environmental sustainability and cultural integrity of the islands, participate in local conservation projects, become acquainted with the region's diverse marine ecology and cultural history, and learn how this region is being impacted by climate change. Where possible, we will connect with local conservation groups and discuss current management challenges with local researchers in Miloli'i. As we hone our skills as naturalists and learn through observation, discussions, journaling, and lectures, our classroom will be the ocean and the landscape.

1) Changing Seas, Coral Reefs, and Climate

Why do some corals appear white, while others are more colorful? Why did Hawaii recently ban sunscreens that contain the chemicals oxybenzone and octinoxate? Students will learn how coral reef ecosystems develop over thousands of years and why these delicate ecosystems are so sensitive to change. Students will have the opportunity to snorkel and complete studies on coral reefs, and investigate how warmer seawater, ocean acidification, pollution, and rising sea level are altering the marine environment. Students will also learn how the ocean plays a key role in carbon cycles and regulates the climate on our planet.

2) The Importance of Monitoring, Research, Collaborations, and Critical Thinking

Students will critically analyze scientific manuscripts and work in small groups to design their own research project. Through active participation in the scientific process, coupled with field observations, unique wildlife encounters, and engaging with experts, students will learn to think critically about complex environmental issues.

3) Hawaiian Culture and Society: Past, Present, and Future

What navigational tools and environmental cues did the Polynesians rely on as they embarked on long oceanic voyages across the Pacific? How has the dynamic Hawaiian landscape influenced the traditions and beliefs of the Hawaiian people? From the early settlement of Hawaii to modern society, students will develop an understanding of the rich culture that exists in Hawaii, the deep connection that exists between Native Hawaiians and the environment, and the struggles that they have faced to preserve their culture and identity. A focus of this work will be the importance of local leadership and agency in conservation and management.

4) Environmental Policy, Sustainability, Conservation, and Social Science

What steps were taken to establish the Miloli'i CBSFA (community-based subsistence fishing area)? What is the Papahānaumokuākea Marine National Monument, and how is this large marine protected area managed? What measures have been taken by fisheries to mitigate bycatch? Conservation challenges, environmental pressures, economic growth, and sustainable methods of farming and fishing will be discussed and analyzed.

5) Critical reading, discussion, and evaluation of primary literature in natural and social sciences.

Throughout this course, we rely on primary literature in lieu of a textbook; therefore, students gain a significant amount of experience reading and critically discussing primary literature. Students read primary literature most days, learning over time and with practice where to focus their attention to be able to critically evaluate the work. Many readings are debriefed with a group discussion, ensuring that students have understood the work and are able to critically evaluate it.

These topics will be addressed through lectures, group discussions, course readings, field activities, interacting with local experts, participating in ongoing monitoring efforts, and field research projects. Our overarching goal is to have students leave the course with an extensive knowledge of our region, a set of broader skills, and an understanding of various aspects of marine ecology, management, environmental science, and social science. The knowledge and skills that are gained during the program will allow students to critically evaluate information in other settings in their future lives and careers. **Note that prior field research experience is not required. All necessary skills will be taught on-site in Hawaii.** Our primary requirement is that you are enthusiastic, adaptable, genuinely open-minded, and ready and willing to learn. We look forward to you joining us and sharing this once-in-a-lifetime experience together.

III. Course Description

ESCI 437B, Environmental Field Survey (5 quarter units / 3.35 semester credits) – Field studies course focusing on field survey methods and on-site biodiversity analysis and assessment as part of individual and group research on environmental issues.

Experiences/Activities: Students will learn the essentials of conducting research in the field. This course will teach some common techniques and methodologies that are used by scientists to monitor ecosystem structure and function, particularly with respect to coral reef ecosystems. Students will identify species, conduct surveys along transects, and complete population counts of certain species. Students will gain an understanding of how citizen science can assist with long-term research efforts, and how observatories are critical for scientific advancement.

Observation logs, participation in data collection and analysis, and completion of student research projects will be evaluated for effort, critical analysis, concept, and clarity. Students will complete a class research project and lab write-up and work in small groups to design a research proposal.

Outcomes: Students will develop skills in field observation, research methodologies, data collection, and data interpretation. Students will be able to critically read, evaluate, and discuss primary literature and reports, and gain a thorough understanding of designing, implementing, and conducting research. Through assisting researchers with monitoring and conservation efforts, and by designing their own research projects, students will become familiar with the process of scientific investigation and collaboration.

Evaluation/Assessment: Demonstrate synthesized knowledge of field research, analysis, and presentation. Specific due dates will be provided during the course for each assignment.

Field Data Notebook	25%
Organism Presentation	10%
Data Collection and Analysis	20%
Research Group Report	30%
Participation & Discussions	10%
Final Reflection	5%

IV. Assessment

Below is an overview of the academic requirements for the program. Some of the assignments are ongoing (e.g., journals, readings, presentations, quizzes) and others have specific dates (e.g., essays, projects). Specific due dates will be assigned during the program. Final grades will be based on the following items:

1. Field Data Notebook – 25%

The Field Data Notebook is an integral part of the Hawaii program and the ESCI 437B course. It is used to document our various field activities, and as a way to keep track of the different flora, fauna, and research that we conduct along our journey.

Field Data Notebook guidelines:

Most students keep a separate notebook and transcribe the daily data and activities into that notebook. This works well as it also allows you to reflect on the activities and better synthesize your conclusion. BE NEAT.

Students will be graded on:

- Activity descriptions: give an overall description of what we did.
- Sampling design: be sure to explain what you did in detail.
 - Where it was
 - What the METHODS were; so someone could pick up your notebook and do it too!
 - What materials you used
 - Draw diagrams if needed to explain things – this is often very effective
- Scientific question analysis: what questions did we ask?
- Rough data analysis and results.
- Outline any problems you had with the sampling and how it might be done better next time.
- Include relevant aspects of our evening discussions and wrap-ups in your notebooks.
- A conclusion – what did it all mean to you?

Your Field Data Notebook should be able to be used by yourself or a colleague to conduct the sampling outlined. This is why descriptions, materials, methods, problems, and conclusions are so important.

Grading of the Field Data Notebook will use the following criteria:

- Organization: neat and organized (table of contents, dates, etc.)
- Consistency of Use: Includes each region that we visit and demonstrates attention to key species and features that we see.
- Effort: Reasonable effort has been invested into the process (i.e., Latin names are included when possible and thoughtful, detailed descriptions, observations, and notes are provided) throughout the entire program.

The Field Data Notebook should include:

- i) **Field Daily Log**: The field study log will be used to keep track of our daily activities during our time in Hawaii, to note observations, document notable flora, fauna, and geographical features that we encounter at each study locale, and to capture personal reflections about the work. The log is not meant to include everything that we see. It is a tool to describe the regions that we visit, hone our observation skills, and document species that are dominant, that you find interesting, or are rare sightings (e.g., whales, sea turtles, etc.).
- ii) Notes/key take aways from **guest speakers**
- iii) **Data collection**: Each day that we collect data, the notebook should include detailed methods, a summary of data collected, any challenges, or other notes, and any protocols that were changed. In addition, include a set of 'research questions' you thought about that day.

Example format:

1. Date & Times:	Head your daily log entry with the date and the times of key events (start and end).
2. Location:	Give the name of the area and the name of the hiking trail/route. If available, include key GPS coordinates.
3. Weather:	Start/end conditions and notable weather changes that occur during the trip, e.g., temperature, % cloud cover, rain, fog, wind direction, etc.
4. Route Description & Map:	Concise description of the route travelled, with distances, times, notable markers or changes in direction. Sketch route map with key features including north arrow.
5. Habitat(s):	Broad description of the area's habitat types (e.g., glacial moraine, lava field, geothermal lands), noting changes in habitat type and ecological/geological changes that occur along the trail.
6. Flora and Fauna:	Descriptions of dominant/notable vegetation that is found and sightings of any animals (Note any interactions/associations between the biological/physical landscape that you notice)
7. Geography:	Descriptions (and names if available) of the prominent geological features (e.g., glaciers, mountains, waterfalls, etc.) that we see during the trip.
8. General Commentary:	A brief personal summary that reflects on the hike and/or other notable observations (e.g., soils, debris, leaf litter, scat, etc.)
9. Observation Descriptions & Sketches:	Descriptions of 3-5 species/geological features that you observed, sketch the species/feature and label (including scale).
10. Two Questions:	Conclude with two detailed questions about ecological/geological/cultural phenomena related to or inspired by the events of your day.
11. Methods	A brief description of field methods used during the day.
12. Results	What data did you collect? What does it mean?

2. Peer Oral Presentation – 10%

During the program, students will be learning from their peers about various species present in Hawaii. Students will be giving a 5-10-minute presentation and are responsible for writing a short (a few journal pages), comprehensive essay in their journal that compiles key concepts that describe what they have learned from their peers and emphasizes adaptations, behaviors, threats, etc. that are similar/contrasting between the organisms that they learned about. The summary does not need to describe every organism that was presented, but it should be sure to include concrete examples that demonstrate that the student has paid attention during presentations and is able to draw connections between overarching concepts and themes.

Grading of the peer oral presentation summary will use the following criteria:

- **Concept:** Information delivered is relevant, accurate, and coverage is appropriate.
- **Synthesis:** The essay is comprehensive and able to synthesize information learned.
- **Clarity:** The essay should be well-written, easy to read, and flows smoothly.
- **Effort:** The essay should demonstrate that the student paid attention during the presentation.

Oral presentations are graded according to:

- **Content:** Information delivered is relevant, accurate, original, creative, and coverage is appropriate.
- **Structure:** Presentation has a logical flow and adheres to the time limit.
- **Delivery:** Student gives presentation in an engaging manner with good posture and is well spoken.
- **Discussion:** Student is able to answer questions and facilitate discussion around the key points.
- **Bullet Point Summary:** 1-2 page overview of key points of their assigned topic. The summary can be handwritten or typed/printed out. The summary must include a reference list (e.g., articles, books, websites, personal sources, etc.), and students must use a minimum of three different primary sources. Plagiarism (i.e., cut/paste verbatim) will not be accepted.

3. Data Collection and Analysis – 20%

Students will demonstrate their ability to collect field data using various scientific equipment. Students will be assessed on their data sheets, organization, reef survey and transects and their ability to utilize these data for analytical and statistical processes such as species diversity indices, regression, and graphing results. It is ESSENTIAL that all data sheets are turned in with complete and legible records of your work in order to maintain the integrity of our study.

4. Research Project/Report – 30%

The importance of establishing research/monitoring projects and protocols is one of the themes that will be focused on during our time in Hawaii. With this in mind, students will develop a research and/or monitoring proposal, based on data we are collecting, with the vision that it will be implemented in the future by researchers, students, or citizen scientists. It will consist of two main parts: **I. An analysis of data and conclusions and II. A management plan to address concerns.** The plan should take into consideration both environmental and human dynamics. The project can draw on theory provided in lectures, articles, field activities, and practice from other monitoring exercises conducted during the program. Students will write a group report and present it orally (approx. 10 minute presentation) to the rest of the class. The proposal should include the following sections:

<p>I. Project Summary A short paragraph that concisely summarizes the project (comparable to an abstract)</p> <p>II. Background Information: Description of the system (study area, feature, species, etc...).</p> <p>III. Study Objectives Presents the objectives, key questions, hypotheses, and goals of the study.</p> <p>IV. Methods and Materials Describes the experiential approach of the proposed study. What field and lab methods will be required, what materials and equipment are needed, how often will sampling occur.</p> <p>V. Data Analysis: What kind of data will be produced, and how will it be analyzed, managed, and disseminated. *Address any limitation that there might be in your study in this section</p> <p>VI. Expected Significance and Broader Impacts Why is this research important and what will be gained from it. What are the broader impacts (e.g. will it provide student opportunities, benefits to the community, any products/technology developed from the work)</p>
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Grading of the Research Project will use the following criteria:

- Organization: Report is written in an organized, logical way that follows the above format.
- Content: Provides an appropriate amount of information that fully presents the proposed study. The proposal convinces the reader why it is important and necessary, and it demonstrates that the students have thoroughly thought through *what* will be done, *how* it will be done, and *why* it will be done.
- Clarity: The proposal should be well-written, easy to read, with concrete objectives and a clear plan that is easy to follow.
- Effort: The report demonstrates that concerted effort has been invested into the process.
- References: If literature was used, it needs to be cited.
- Presentation: Groups are able to articulate their study to the rest of the group and answer questions.
- Group Participation: Individuals are active participants in the group process, and work is evenly shared.

5. Participation & Discussions – 10%

Students will be evaluated based on their general engagement and enthusiasm with all field & camp activities, their contribution to group projects and adherence to safety guidelines. It is important for students to have a positive attitude and to be respectful to each other and anybody else who they are working with in the field. Students will also be evaluated based on their willingness to participate and engage in discussions regarding the scientific literature that we read. During the course, students may be assigned certain papers where they will assume the leader role of the discussion.

6. Final Reflection – 5%

Students will prepare a final reflection (in your notebook) on the development of their worldview throughout the program that serves as a synthesis of elements included in their notebook. Students will detail their worldview and place it in context alongside other (cultural and ecological) worldviews studied or encountered during the program. Students may integrate their ideas about where and how their own perceptions and beliefs were challenged, dislodged, or reinforced. Students are encouraged to make links with ideas about their own evolving naturalist intelligence and/or social-ecological connectedness, and to refer to the people (i.e., from peers, presenters, locals, researchers, travelers, etc.), relevant readings, landscapes, and personal experiences that have been of significant influence throughout the program. The final reflection serves as an additional and final entry for the notebook.

Grading of the Final Reflection will use the following criteria:

- **Organization and Structure:** Ideas are logically ordered and cohesive
- **Analysis:** Clearly identifies key contrasting perspectives encountered during the program and explains the role they have played in contributing to one's own worldview.
- **Synthesis:** Integrates different perspectives and articulates a distinct set of values or way of looking at the world.
- **Style:** Reflection is well-written, writing is succinct and engaging, and key points are effectively conveyed.
- **References:** If literature was used, it needs to be cited.

V. Grading Scheme

To convert final grade percentages to letter grades for each course that will appear on your transcript, we will use the following grading scheme:

Grade	Percentage	Grade	Percentage	Grade	Percentage	Grade	Percentage	Grade	Percentage
		B+	87.5 - 89.9	C+	77.5 - 79.9	D+	67.5 - 69.9	F	< 59.9
A	92.5 - 100	B	82.5 - 87.4	C	72.5 - 77.4	D	62.5 - 67.4		
A-	90.0 - 92.4	B-	80.0 - 82.4	C-	70.0 - 72.4	D-	60.0 - 62.4		

VI. General Reminders

Academic Integrity is as relevant in this field course as it is at your home institution. Plagiarism, using the ideas or materials of others without giving due credit, cheating, or putting forth another student's work as your own will not be tolerated. Any plagiarism, cheating, or aiding another to cheat (either actively or passively) will result in a zero for the assignment. Cases of academic dishonesty may be reported to your home institution.

Assignment deadlines are established out of fairness to other students, and they are necessary so the instructors can get the grading done on time. Therefore, deadlines are firm and work that is turned in late will be penalized and receive a 5% deduction. If the assignment is more than 2 days late, an additional 10% will be taken off. If you think circumstances may keep you from completing your work on time, talk to the instructor as soon as possible and certainly before the assignment is due.

Participation and attendance are crucial throughout this program. Because of the demanding schedule and limited time, all components of the program are mandatory (unless indicated) and missing even one lecture can have a proportionally greater effect on your final grade. Hence, it is important to be prompt and prepared with the needed gear and equipment for all activities.

Students with special needs or disabilities should meet with a lead faculty member as soon as possible to discuss any special accommodations that may be necessary.

VII. Required Materials

- **One larger durable notebook**— (i.e., for your field notebook assignments)
- **Smaller durable notebooks** for taking notes during lectures and while in the field. For your smaller notebooks, we recommend Rite in the Rain pocket books (<http://www.riteintherain.com/pocket-sized-field-flex-books>). It is up to you how many to bring. If you tend to write large, or take a lot of notes, consider bringing a few small notebooks. You will use your field notes to complete the graded assignments in the larger notebooks. All notebooks are available directly from Rite in the Rain or Forestry Suppliers or other channels.

Alternative compact hardback or tough softback bound notebooks may be suitable for all the above. Whatever your choice, ensure the larger notebooks contain at least **80 pages**, are durable, and can fit in a large Ziploc bag. Avoid cubic grid line formats. Your smaller notebook(s) should be small, weather resistant, and durable. For all books, avoid flimsy wire spiral bound notebooks and soft cardboard covers. They deteriorate quickly and frustrate you when writing in them and us when grading them.

- **Writing materials:** Pencils are recommended for writing in the field notebook (include at least one 2B pencil). They are the only way to keep your notes waterproof when using Rite in the Rain. In addition, extra lead or a small sharpener is advisable. Pens for other situations. We will draw; colors are optional but if you like colors then bring some in the form of colored pencils, crayons or watercolors.
- **Folder:** To safely store any handouts or pamphlets. Bring some loose leaf sheets of paper in your folder for field quizzes and to use as scratch paper.