



THE CHILE PROGRAM
PATAGONIA ECOSYSTEMS
WINTER 2024
JANUARY 23 – MARCH 6

ACADEMIC SYLLABUS

Faculty: Jenna Spackeen, PhD

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. Additionally, there will be a number of “check-in days”, where we will arrange student-faculty meetings. Students are encouraged to engage with faculty to discuss assignments or any other personal issues or concerns as needed.

Class Meetings: The Wildlands Studies Program in Chile 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 and end much later 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 a Wildlands Studies Program receive credit for three undergraduate courses. These three courses have 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.

1. **ESCI 497T, Environmental Wildlands Studies (5 quarter units / 3.35 semester credits)** – Field study of the ecology, geology, and environmental challenges of our study region, including the role of human interactions.
2. **ESCI 497U, Environmental Field Survey (5 quarter units / 3.35 semester credits)** – Study and application of field surveys, sampling methodologies, ecosystem restoration techniques, data management, including on-site data collection, assessment, and analysis.
3. **ESCI 497V, Wildlands Environment and Culture (5 quarter units / 3.35 semester credits)** – Study of social-ecological systems, drawing on locally relevant cultural perspectives and historic and present-day human relationships with the landscape, the environment, and wildlife. Includes group dialogue and personal reflection to track one’s own learning.

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 sent 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 or placed in a binder). 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 that are used to supplement field activities will be carried around in a shared reference library.

Contents of this syllabus:

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I. Program Overview

This is an academically rigorous program that will take us to the stunning and ecologically fascinating landscapes of Chilean Patagonia, from the Andes Mountains to the Pacific Ocean and everything in between. Patagonia was one of the last places in the world to be explored and remains one of the most rugged and remote on Earth. The Los Lagos region, located in Northern Patagonia, is characterized by diverse landscapes. Be prepared to immerse yourself in a learning environment amidst a backdrop of ancient forests, active volcanoes, expansive fjords, glacially-carved mountains, and a coastal environment teeming with marine life.

Within the Valdivian temperate forest, which blankets a large portion of the Los Lagos region, species have remained relatively isolated since the breakup of Gondwana 200 million years ago. Isolation has created ideal conditions for the evolution of unique flora and fauna. Massive alerce trees, which can be 5000 years old, tower overhead, and tiny creatures such as the pudu, the world's smallest deer, can be found hidden within the vegetation. Aptly nicknamed the 'Land of Miniatures and Giants,' this ecoregion within Patagonia is characterized by extraordinary diversity and a high degree of endemism.

Although this region remained untouched for millions of years, humans have altered the landscape. The first human inhabitants migrated to Patagonia approximately 15,000 years ago. These early groups of people were nomadic and relied on the region's megafauna as their source of food. By the time explorers from Europe reached the area in the 1500's, humans were a key component of the environment and several species in the region had gone extinct due to both human pressure and climatic changes. European contact had a huge influence on the livelihood of the native people, and livestock soon became embedded in the culture. Despite rampant diseases and ensuing conflicts between native groups and the Europeans, the Mapuche people were able to persevere and are the most prevalent Indigenous group in Chile today.

Though Patagonia retains its wild nature and parts of it are relatively inaccessible, its varied ecosystems have been shaped by agricultural practices, hunting, deforestation, and the introduction of non-native species, all of which have degraded the environment and resulted in species that are threatened. The impacts of climate change are also being felt across the region with warmer temperatures causing glaciers to retreat at an unprecedented rate. In the face of deteriorating ecosystems, conservation measures such as the establishment of national parks and private reserves have been spearheaded by the Chilean government and local conservationists. These efforts seek to create sustainable livelihoods for local communities while protecting biodiversity through participation in ongoing conservation, restoration, and sustainable agriculture projects. Even with impressive conservation measures in place, challenges remain, ranging from unsustainable and unregulated resource use to ambitious multinational development plans including new roads, dams, and salmon farming.

Team Activities & Program Itinerary

The program will begin near Puerto Montt, Chile, at Parque Katalapi, a private conservation park. There we will do our orientation, introduce the concepts that will be focused on during the program, and initiate our marine debris study. We will discuss natural history as we familiarize ourselves with local flora and fauna, while being surrounded by a temperate rainforest.

From Katalapi, we will travel to Parque Volcánico Valle Los Ulmos. Here we will be immersed in a landscape where the flora, fauna, and geology all reveal the area's dynamic past: Volcán Calbuco recently erupted in April 2015. This field site will provide the perfect opportunity to learn about different types of volcanoes, study ecological succession, and discuss how active volcanism has shaped the communities that inhabit the northern areas of Patagonia.

After our visit to Volcán Calbuco, we will head east towards the Andes Mountains. First, we will camp near Estuario Reloncavi, an expansive fjord system that showcases how coastal Patagonia has been shaped by glaciers. We will learn about the importance of fjords in supporting marine life, and we will discuss Chile's bivalve and salmon industry while learning about water quality and harmful algal blooms. A short distance from Estuario Reloncavi is the trail head of our next field activity and biggest backcountry trek: an eleven-night journey through the Cochamó Valley. We will be assisted by horses and local guides for this leg of our journey, which makes use of an old cattle-driving and trade route that connects Chile to Argentina. We will be rewarded with views of massive granite walls, pristine lakes, and nearly unspoiled ancient forests full of plants and animals rarely seen elsewhere. As we make our way through the valley, we will learn about the principles of biogeography, and how these principles have given rise to the unique flora and fauna that characterize the region. We will discuss climate change while learning about rapid glacial retreat in the area, and we will learn about conservation efforts that have been done by the local communities to preserve this amazing corner of Patagonia.

The cultural significance of the land will be woven into our journey as we spend time at remote ranches and learn about the history of the Indigenous Mapuche people. We will gain insight into their struggles in the wake of Spanish contact, and we will discuss the current political and social challenges that their community faces in modern Chile. After completing our backpacking trek, we will spend time at Raíces del Viento, where we will gain first-hand knowledge about sustainable practices through immersion in an active permaculture operation. We'll be able to enjoy delicious locally grown veggies, while participating in volunteer activities and doing our part to help out on the farm. Our stay at Raíces del Viento coupled with our interactions with community members in the Cochamó Valley will demonstrate how people in the region are able to live off the land.

After a quick stop in Puerto Varas to resupply, we will make our way to Chiloé Island, Chile's second largest island. We will spend a few days at the Senda Darwin Biological Station, a site of important ongoing research. On Chiloé Island, we will also embark on a backpacking trek to reach our final field site, located on the Pacific Coast. Here, we will dive deeper into the ecological importance of Chile's incredible marine environment. We will explore the intertidal zone and learn about the critical role that the ocean plays in the global carbon cycle. We will continue to learn about the way that Chile manages its land and the importance of private reserves, while trying to spot the local populations of Humboldt and Magellanic penguins that inhabit the island. During our time on Chiloé island, we will finish our marine debris study and students will have the opportunity to design and present their own research projects. We will return to Parque Katalapi, our first field site, for the last few nights of the program where we will celebrate the successful completion of the program, and, finally, go our separate ways.

As we make our way through the Los Lagos region of Chile, we will be staying at field stations, camping, and going on multi-day backpacking treks. A flexible mindset, patience, and a willingness to embrace the challenges that are an inevitable aspect of studying outside will allow you to gain the most from your Wildlands Studies experience. The program is guaranteed to provide unparalleled learning opportunities and an adventure of a lifetime.

II. Learning Objectives

We have multiple goals for our Chile Program. We will make our way around Northern Chilean Patagonia to learn about coastal and terrestrial ecosystems, participate in research, and engage with local communities and various stakeholders to understand pressing environmental challenges, conservation success stories, the connection between science and policy, and the culture of the region. Students will have the opportunity to participate in ecosystem monitoring and they will complete individual and group research projects. We will be based out of field stations, private conservation parks, and remote campgrounds as we hone our skills as naturalists and learn through observation, discussions, journaling, and lectures. The overarching themes that will be covered during the program are described below.

1) Patagonian Ecosystems, Biogeography, and Natural History

How did the various ecosystems that comprise Patagonia form? What flora and fauna exist in the region? Why is the geography of Chile the perfect setting for the evolution of endemic species? Students will answer these questions and more by exploring interesting geologic phenomena, including the site of a recent volcanic eruption, backpacking through the Andes while identifying key species, and discussing what it means to be a naturalist while learning about Darwin's early investigations in the area. Through field study within the Los Lagos region of Patagonia, students will gain an in depth understanding of the interconnectedness between geology and ecology, and how ecological pressures facilitate the evolution of unique species.

2) Climate, Carbon Cycles, and a Changing Environment

What is the Keeling Curve? How do volcanoes, mountains, and the ocean impact the carbon cycle? What is the status of the glaciers in the region? Using Chile as a natural laboratory, students will learn how mountains and the ocean play a critical role in regulating the planet's climate, why these ecosystems are sensitive to change, and the global implications of melting ice and climate change.

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

How are conservation efforts being implemented across Patagonia? How do scientists predict when volcanic eruptions will take place? What types of marine debris are the most prominent on the Pacific coast compared to within estuaries? Students will have the opportunity to spend extended periods of time at field stations where they will be able to interact with local researchers and conservationists. Students will critically analyze scientific manuscripts, complete a project focused on marine debris, and assist with ongoing monitoring efforts. Students will ask their own questions, collect data, analyze results, consult scientific literature, and work in small groups to develop their own research projects. 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.

4) Culture and Society of Patagonia and Chile: Past, Present, and Future

What did Patagonia look like when it was originally settled by humans? How did European contact influence the culture of the region? How have people persisted in such a rugged and remote environment and how will they adapt to future changes? From the early settlement of the region to modern Chilean society, students will gain an in depth understanding of the rich history and culture that exists in this part of the world with an emphasis on indigenous perspectives.

5) Environmental Policy, Sustainability, Wildland Conservation, and Social Science

Is the salmon fishery in Chile considered sustainable? How is land managed in Chile and how can private parks be used to create conservation corridors? Should the environment itself be a stakeholder when deciding on policies? Questions pertaining to conservation challenges, environmental pressures, and sustainability will be discussed and analyzed. Students will engage with stakeholders, critically analyze environmental policy case studies, and investigate the human element of environmental science.

6) Energy and the Environment

With large river systems, steady winds, active geology, and a large tidal swing, are renewable sources of energy being used in Chile? Students will learn about different energy sources, discuss the pros and cons of each, and critically make connections between energy production, carbon cycling, and global climate.

7) Basic backcountry skills, including backpacking and field navigation

Although not the focus of this course, students will gain experience in planning for a backpacking trip, how to travel safely and mitigate risk, and how to cook in a backcountry setting.

These topics will be addressed through lectures, group discussion, course readings, field activities, interacting with local experts, participating in ongoing research and conservation 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 ecology, geology, oceanography, 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 Chile.** Our primary requirement is that you are enthusiastic, adaptable, genuinely open-minded, and ready and willing to learn. This once-in-a-lifetime experience.

III. Course Descriptions

We teach these three courses in an integrated format in the field. However, students will receive transcript credit for the following three courses, as introduced on page 1:

ESCI 497T, Environmental Wildlands Studies (5 quarter / 3.35 semester credits) – Field study of the flora, fauna, ecology, marine systems, geology, geography, and natural history that characterize Chilean Patagonia, including historical, current, and future environmental challenges associated with humans.

Experiences/Activities: In this course, students will learn about different geologic features and the dominant flora and fauna that are found throughout southern Chile and Patagonia. They will also become familiar with Chile's marine ecosystems, and they will learn how the ocean, carbon cycling, and climate are intrinsically connected. Several complicated environmental issues will be analyzed during the program, and students will learn directly through attentive observation, hands-on experience, as well as through guidebooks, lectures, peer presentations, discussions, and stakeholder interactions.

Before the start of the program, students will be required to prepare an oral presentation on an assigned topic that relates to the flora and fauna of the region. Students will deliver their presentations on-site, acting as the local "expert" on the topic. Additionally, students will create a detailed field journal during the course as they record their observations and personal accounts of the places that they learn about and explore.

Outcomes: Students will develop their skills as naturalists, and they will be able to demonstrate an understanding of the ecology and geology of southern Chile and the human impacts that have shaped the country over time. Students will be able to critically analyze complex environmental challenges pertinent to Chile and Patagonia.

Evaluation/Assessment:

Field Journal	40%
Oral Presentation	15%
Field Quizzes	10%
Final Exam	25%
Participation & Discussions	10%

ESCI 497U, Environmental Field Survey (5 quarter units / 3.35 semester credits) – Study and application of field surveys, sampling methodologies, ecosystem restoration techniques, including on-site data collection, assessment, and analysis at various coastal and terrestrial sites in the Los Lagos region of Chile.

Experiences/Activities: Students will learn the essentials of conducting research in the field, and they will become familiar with the overall research process. This course will teach some common techniques and methodologies that are used by scientists to monitor ecosystem structure and function. Students will identify species and geologic features, conduct surveys along transects, complete population counts of certain species, and study marine debris. Students will also gain an understanding of how monitoring and conservation efforts are being coordinated between private conservation parks within Chile.

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 also complete a class research project and lab write-up focused on marine debris.

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 they will 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:

Field Study Log	30%
Marine Debris Class Project	15%
Research Project	10%
Field Quizzes	10%
Final Exam	25%
Participation & Discussions	10%

ESCI 497V, Wildlands Environment and Culture (5 quarter units / 3.35 semester credits) – Study of social-ecological systems of Chile and Patagonia, drawing on locally relevant cultural perspectives and historic and present-day human relationships with the landscape, the environment, and wildlife. Includes group dialogue of the readings and personal reflection to track one’s own learning.

Experiences/Activities: In this course students will learn about the culture of Chile with an emphasis on Patagonia and indigenous perspectives. Students will understand how the culture of the region is deeply tied to the environment and the land. Students will learn about the history of Chile spanning from early settlements to modern culture. They will become familiar with common Chilean traditions and livelihoods, and they will learn about the Mapuche people, the dominant native group in the region. Students will become aware of the resiliency of communities that live in this part of the world, and how the people have faced unique challenges from volcanic eruptions and strong earthquakes to mitigating the impacts of climate change.

During this course, the cultural journal will be used to record key information provided by local guest speakers, and it will be a safe space for students to reflect on cultural interactions, think critically about the complex relationships that exists between humans and the environment, and gain an awareness of their personal worldview. Students will also build a cultural log of words, expressions, and ideas that they learn during their time in Chile that are culturally unique to the region. Additionally, as we make our way through the cultural readings, students will be assigned certain sections to provide thoughtful dialogue and summaries to the rest of the class.

Outcomes: Students will gain a deep appreciation and respect for Chilean culture and society and for people who inhabit the southern-most region of South America. They will understand how historical events and the landscape have shaped the way that Chilean society has evolved. They will become familiar with terms in Spanish and in the Mapuche language that are relevant to the field, and they will be able to critically assess the strategies that Chile is practicing to minimize environmental impacts while meeting the demands of a modern world. Students will also develop a heightened awareness of their own worldview through thoughtful reflections.

Evaluation/Assessment:

Cultural Journal	40%
Reading Summary Narrative	10%
Final Reflection	10%
Field Quizzes	10%
Final Exam	20%
Participation & Discussions	10%

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. exams, essays, projects). Due dates are subject to change in response to local variables. Final grades will be based on the following items:

Course Number	Assessment Item	Due Dates <i>*specific dates assigned during course</i>	Percent of Grade
ESCI 497T	Field Journal	Checks throughout and in the last week	40
	Oral Presentations	Throughout	15
	Field Quizzes	Throughout	10
	Final Exam	4-Mar	25
	Participation	Throughout	10
ESCI 497U	Field Study Log	Checks throughout and in the last week	30
	Marine Debris Project	Last week of the course	15
	Research Project	Week 5 of the course	10
	Field Quizzes	Throughout	10
	Final Exam	4-Mar	25
	Participation	Throughout	10
ESCI 497V	Learning Journal	Checks throughout and in the last week	40
	Reading Narrative	Throughout	10
	Final Reflection	Last week of the course	10
	Field Quizzes	Throughout	10
	Final Exam	6-Mar	20
	Participation	Throughout	10

ESCI 497T, Environmental Wildlands Studies (5 quarter / 3.35 semester credits)

1. Field Journal – 40%

The field journal is an integral part of the Chile program and the ESCI 497T course. It serves as a learning tool and is an opportunity to closely become aware of the surrounding environment, document observations and places that we visit, and reflect on experiences. The field journal will be ongoing throughout the course, and students are encouraged to regularly keep up with entries. The field journal will consist of creating natural history journal entries adapted from the Grinnell Method, and other nature writing approaches (see Parker article).

Class notes and personal notes are not included as formal journal entries, although we do encourage students to take notes, as they will be useful for crafting journal entries, for other assignments, and for studying for exams. Students will be instructed on the best way to organize their journal at the start of the program, and the journal will be collected periodically during the program for review and in the last week of the program for a final review.

The Field Journal will consist of the following components:

i) Grinnell Trip Logs (10%): Approximately two entries from locations as prescribed by the instructors. This adapted Grinnell Trip Log is a structured, descriptive narrative that documents select hikes and field walks. The log is a careful summary of observations and field notes taken throughout the day. The entry usually takes about 2 hours to write-up, but may take longer depending on the length of the walk. Your entry should include the 10 essential elements outlined below:

1. Date & Times: Head your trip log entry with the date(s) of the trip and the times (start and end)
2. Location: Give the name of the area and the name of the hiking trail/route. If available, include start/end 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. rainforest, lava field, wetlands, steppe, etc.), 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. rivers, 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.
10. Two Questions: Conclude with two detailed questions about ecological/geological phenomena encountered that got you wondering.

Grading of Grinnell Trip Log entries will use the following criteria:

- **Organization:** Entries are written in an organized way and should follow a logical format that is consistent with the established criteria listed above.
- **Completeness:** Includes the essential elements and prescribed entries have been completed.
- **Accuracy of Content:** Provides an accurate and comprehensive reflection of phenomena encountered during the trip (e.g., correct descriptive data, features seen, species encountered).
- **Clarity:** The entry should be well-written, easy to read, and should be prepared so that others can use it as reference.
- **Effort:** The entries should demonstrate that concerted effort has been invested into the process.

ii) Nature Writing (20%): From locations as prescribed by the instructors, approximately four to five entries. These entries involve deeper and more creative reflection and require students to focus in on the ecological and physical aspects of their sensory experiences. The emphasis is on the phenomena that the student actually senses and experiences, it is not meant to be a summary of information that they learned or read that day. Entries should be inspired by and related to the specific place and will typically be completed on site (e.g., silent observation while sitting in a single spot).

Grading of Nature Writing entries will use the following criteria:

- **Use of Language:** Using rich creative language (e.g., metaphor, simile, alliteration, onomatopoeia).
- **Diversity of Expression:** Employing a diversity of writing/journaling techniques (e.g., poetry, dialogue).
- **Sensory Detail:** Encapsulating a range of sensory detail (sight, sound, smell, touch, etc.).
- **Natural Descriptions:** Making clear links to ecological observations with your writings.
- **Wider Reflection:** Using the scene and your observations to generate wider reflections on nature.

iii) Other Assignments (10%): Refers to any other specific journal activity or assignment given by the instructors throughout the program, and may include field survey exercises, ethology exercises, sketches, and opportunistic observation activities.

2. Oral Presentations – 15%

Students will be assigned a topic approximately a few weeks before the start of the program. Leading up to the program, students will research their assigned topic and come prepared to give a presentation (10-15 minute presentation + 5 minutes for questions/discussion). Topics will relate to the flora and fauna of Patagonia, and students will have to answer a research question related to their topic. On the day that the presentation is given, students will turn in a 1-2 page summary of bulleted information.

Grading of Oral Presentations will use the following criteria:

- **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 generate/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. Field Quizzes – 10%

During the course at least two field quizzes will be administered to test the student's knowledge of the ecological, geological, and environmental concepts that have been covered during the course.

4. Final Exam – 25%

In the last few days of the program, students will take a written exam to assess their understanding of key themes and concepts related to ecology, geology, oceanography, geography, and environmental issues that were addressed throughout the course. The exam will include short and long essay questions that assess the student's ability to demonstrate thorough comprehension of themes covered during the program.

5. Participation & Discussions – 10%

Includes general engagement with the subject matter, attentiveness during peer presentations and lectures, and active participation in group readings and discussions.

ESCI 497U, Environmental Field Survey (5 quarter / 3.35 semester credits)

1. Field Study Log – 30%

The field study log is an integral part of the Chile program and the ESCI 497U course. It is used to document our various field activities, and as a way to keep track of the different ecosystems, flora, fauna, and geological features that we encounter along our journey.

Students will be instructed on the best way to organize their field study log journal at the start of the program, and the journal will be collected periodically during the program for review and in the last week of the program for a final review.

The Field Study Log journal will consist of the following component:

Field Study Log (30%): The field study log will be used to keep track of the regions that we visit during our time in Chile, to note an interesting observation from each region, and to document notable flora, fauna, and features that we encounter at each study locale. 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., otters, foxes, etc.). You may also include geological features (e.g., volcanoes,

waterfalls, etc.) in your log. The log should be organized by region where we camped or spent extended periods of time (e.g., Parque Katalapi, Valle Los Ulmos, etc.), listing the date(s) that we spent in the region, a description of the region, an “In this region I noticed....” entry, and species/notable features that were encountered in the area. Approximately 5 species/notable features should be included per region with through notes about the species. Sketches and/or pressing plants into the notes section is useful and appreciated.

The log should follow the example template below:

Region:		Dates:						
<p>Description: <i>A broad description (paragraph or two) that provides an overview of the region. Where is this region located? Are there any prominent geographical features that characterize the region? What type of ecosystems exist in the region? What is the climate like in this region?</i></p>								
<ul style="list-style-type: none"> • "In this region I noticed...." Description of a specific ecological or geological phenomena that you observed in the region (e.g. species interaction) that ignited your sense of curiosity or newfound learning. Describe the observation and explain why you think this observation occurred. 								
<p>Species/Features from the Region</p> <table border="1"> <thead> <tr> <th><u>Species/Feature Name</u></th> <th><u>Specific Site</u></th> <th><u>Notes</u></th> </tr> </thead> <tbody> <tr> <td>Include latin name if available.</td> <td>If known, include the specific site within the general region</td> <td>Relevant notes about the observation (e.g. behavior, appearance, key characteristics, etc.). You may include a sketch if you'd like.</td> </tr> </tbody> </table>			<u>Species/Feature Name</u>	<u>Specific Site</u>	<u>Notes</u>	Include latin name if available.	If known, include the specific site within the general region	Relevant notes about the observation (e.g. behavior, appearance, key characteristics, etc.). You may include a sketch if you'd like.
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Include latin name if available.	If known, include the specific site within the general region	Relevant notes about the observation (e.g. behavior, appearance, key characteristics, etc.). You may include a sketch if you'd like.						

Grading of the Field Study Log will use the following criteria:

- **Organization:** The log is neat and is organized according to the above format.
- **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)

2. Marine Debris Project – 15%

At select coastal locations, students will complete a class marine debris project as they participate in a beach cleanup. Students will use field survey techniques to quantify the presence of debris, and we will categorize the debris according to type. Students will be required to write an individual lab write-up for the class marine debris project that includes an introduction, methods, results, and discussion section. More details for the project will be provided on site.

Grading of the Marine Debris Project will use the following criteria:

- **Organization:** The write-up is organized and structured with the appropriate sections.
- **Concept:** Student demonstrates an understanding of why and how the project was completed.
- **Interpretation:** Data is neatly presented, analyzed, and the results are adequately discussed.
- **Effort:** Student demonstrates that concerted effort has been invested into the process.
- **Group Participation:** Contributed to the project in the field, collecting, sorting, and analyzing debris.

3. Research Project – 10%

The importance of establishing research/monitoring projects and protocols is one of the themes that will be focused on during our time in Chile. With this in mind, students will develop a research project and/or monitoring proposal with the vision that it will be implemented in the future by researchers, students, or citizen scientists. The project can draw on theory provided in lectures, articles, field activities, and practice from other monitoring exercises conducted during the program. Students will work in small groups (~3 students) to draft a proposal and present their plan to the rest of the class. The proposal should include the following sections:

I. Project Summary

A short synopsis that concisely summarizes the project (comparable to an abstract)

II. Background Information:

Description of the system (study area, feature, species, etc...).

III. Study Objectives

Presents the objectives, key questions, hypotheses, and goals of the study.

IV. Methods and Materials

Describes the experimental approach of the proposed study. What field and lab methods will be required, what materials and equipment are needed, how often will sampling occur.

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

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)

Grading of the Research Project will use the following criteria:

- **Organization:** Project is organized and presented in a 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 demonstrates that the students have thoroughly thought through the *what* will be done, *how* it will be done, and *why* it will be done.
- **Clarity:** The proposal should be easy to understand, with concrete objectives and a clear plan.
- **Effort:** The proposal demonstrates that concerted effort has been invested into the process.
- **Written Summary and References:** Group completes the written summary as instructed (written summary instructions provided on site) and literature that was used is cited.
- **References:** If literature was used, it needs to be cited.
- **Presentation Style:** Groups can comfortably 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.

4. Field Quizzes – 10%

During the course at least two field quizzes will be administered to test the student's knowledge of species and geologic features they have observed, field survey methods, research and conservation techniques, and data analysis and interpretation.

5. Final Exam – 25%

In the last few days of the program, students will take a written exam to assess their understanding of key themes and concepts related to research methodologies, the process of undertaking scientific investigations, data analysis and interpretation, and the role that science plays with informing policy and management decisions. The exam will primarily include short and long essay questions that assess the student's ability to demonstrate thorough comprehension of themes covered during the program.

6. Participation & Discussions – 10%

Students will be evaluated based on their general engagement and enthusiasm with all field activities, particularly when assisting with research and conservation efforts at the field stations and their contribution to group/peer projects. 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.

ESCI 497V, Wildlands Environment and Culture (5 quarter / 3.35 semester credits)

1. Cultural Journal – 40%

The cultural journal is an integral part of the Chile program and the ESCI 497V course. It is used to document interactions with local experts, and as a way to keep track of one’s own personal development, awareness, and socio-cultural insights that are gained during the program. It will also include a log of culturally relevant concepts and words.

Students will be instructed on the best way to organize their Cultural Journal at the start of the program, and the journal will be collected periodically during the program for review and in the last week of the program for a final review.

The cultural journal will consist of the following components:

i) Guest Speaker Summaries (10%): We expect to be learning from local researchers and experts during the program. For certain interactions, students will be instructed to complete a guest speaker summary in their cultural journal. These entries are not meant to be time consuming and should only take 10-15 minutes to complete. The summary should include the following elements:

Name of Presenter:	Date:
Topic:	Location:
• Provide 3 - 4 bullet points describing key information that you learned during the presentation.	
Question : Write one question that came to your mind related to the presentation topic.	

Grading of the guest speaker summaries will use the following criteria:

- **Organization:** Entries follow the format established above.
- **Completeness:** Includes a completed entry for all guest speakers.
- **Accuracy of Content:** Provides an accurate overview of the presentation.
- **Clarity:** The entry should be well-written, easy to read, with concise bullet points, and a clear question.
- **Effort:** The entries should demonstrate that the student paid attention during the presentation.

ii) Reflections/Creative Entries (20%): At least 4 thorough entries or more if shorter more regular entries are preferred. Students will develop a “social-ecological autobiography” (See Hayes manuscript) in their cultural journal. This includes regular insightful reflections on learning experiences embedded within specific contexts, which can include but is not limited to interactions with guest speakers, local communities, other travelers, your peers, and the course readings. These entries are meant to challenge the student to tap into both their creative and analytical side to find awareness of how their own views and values have been brought into focus or shaped by the experience. Examples of themes that entries might highlight include 1) changes in personal beliefs, perceptions, worldviews, and learning, possibly as part of comparative reflection to past experiences/knowledge/places encountered back in your homeland, 2) key elements and information that finds resonance (appeal) or dissonance (conflict) within you, 3) creative writing about a location/experience that incorporates Chilean cultural beliefs and traditions. Poetry and art are welcomed as individual shorter entries or to complement longer entries.

Each entry begins with the phrase: “*Right now I feel...*” before continuing on to whatever it is you wish to write about (the theme of the entry does not need to be related to your “*Right now I feel...*” statement).

Grading of reflections/creative entries will use the following criteria:

- Consistency of Use: Entries are completed regularly throughout the program (1 entry per week)
- Concept: Entries are creative and demonstrate a high level of contemplation. The theme or experience is explored in depth, from different angles, and incorporates philosophical, social, or creative reflection. Entries use learning experiences to make insightful links between themes, readings, and experiences prior, during, and beyond the program.
- Style: Entries are well-written, and make use of narrative, prose, poetry, art, etc.
- Effort: A genuine effort to write thoughtful, creative reflections is demonstrated.

iii) Cultural Log (10%):

The cultural log is a list of words, phrases, and unique cultural components that are encountered during the program. The log should be comprehensive, including elements in Spanish as well as the language spoken by the Mapuche people. The log should also include historical concepts, figures, and unique ideas that are relevant to the region with a description of their significance.

Cultural Element (Word, Symbol, Concept, etc.)	English Translation and/or Cultural Significance
lonco	Chief (Mapuche); A lonco oversees several communities, Typically the wealthiest men

Grading of the cultural dictionary will use the following criteria:

- Accuracy: Student makes an effort to spell accurately and use appropriate characters.
- Consistency of Use: Student demonstrates an attention to new words/phrases/cultural elements that are encountered throughout the program.
- Effort: Reasonable effort has been invested throughout the program.

2. Reading Summary Narratives – 10%

As a group, we will make our way through reading selections that are focused on Chilean culture and history and people who live in Patagonia. We will periodically get together for “storytelling” sessions. During this time, we may read certain selections out loud, and students will take turns being in charge of guiding a discussion based on the reading or by providing a synthesis of the material. More information regarding reading groups and assignments will be provided during the program.

Grading of Reading Summary Narratives will use the following criteria:

- Synthesis: Student groups successfully synthesize readings and are able to pull key concepts/ideas/information from their assigned sections and reiterate them to the rest of the class in a logical way that can be easily understood.
- Narrative: Student groups deliver the information to the rest of the group in an engaging way and are able to divide the narrative between individuals in the group so that everybody participates in the “storytelling” process. During group narratives, students demonstrate that they are comfortable and familiar with the information that they are sharing with the rest of the class, including being able to answer questions.
- Group Participation: Individuals are active participants in the group process.

3. Final Reflection – 10%

Students will prepare a final reflection (3-4 pages) on the development of their worldview throughout the program that serves as a synthesis of elements included in their cultural journal. 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, and personal experiences that have been of significant influence throughout the program. The final reflection serves as an additional and final entry for the cultural journal.

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.
- **Effort:** A genuine effort to write a thoughtful, creative final reflection is demonstrated.

4. Field Quizzes – 10%

During the course at least two field quizzes will be administered to test the student's knowledge of culture and history, information provided by local experts, and social/environmental issues that have been discussed.

5. Final Exam – 20%

In the last few days of the program, students will take a written exam to assess their understanding of key themes and concepts related to Chilean culture, history, traditions, and how the landscape has shaped the way of life in Patagonia. The exam will primarily include short and long essay questions that assess the student's ability to demonstrate thorough comprehension of themes covered during the program.

6. Participation & Discussions – 10%

Students will be evaluated according to active participation in everyday activities as well as their attitude and involvement when engaging with guests and local hosts. In this particular course, it is important that the student demonstrates a genuinely open mind, a willing attitude, and a respectful etiquette in interacting with team members and local groups. Finally, the student's consistent and positive contribution to the team dynamic (e.g., by embracing assigned roles and responsibilities) will be taken closely into account.

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 the lead faculty member as soon as possible to discuss any special accommodations that may be necessary.

VII. Required Materials

- **Three durable notebooks for coursework**— one for each class (ESCI 497T, ESCI 497U, and ESCI 497V). These notebooks will be used for your class assignments, and they will periodically be turned in to be graded. We strongly recommend Rite in the Rain notebooks (Softcover side bound products that are 4.63 x 7 inches with 64 pages; NO gridlines).: You can find a three-pack for sale on Amazon using this [This Link](#).
- **Additional durable notebook(s) for personal field/lecture notes**— To be successful in the program you will want to take notes during lectures and while we are in the field. For your lecture notebook(s), we recommend Rite in the Rain products as well. Students are often surprised by the quantity of notes they take. Consider bringing [These Notebooks](#) or something similar. You will use your lecture notes to complete the graded assignments that go in your coursework notebooks, to study for quizzes and exams, and to have loose leaf paper on hand.

Alternative compact hardback or tough softback bound notebooks may be suitable for all the above as long as they are weather resistant. Whatever your choice, ensure the notebooks for your coursework contain at least **64 pages**, are durable, and can fit in a large Ziploc bag. Avoid cubic grid line formats. For all books, avoid soft cardboard covers. They deteriorate quickly.

-Pen(s), Pencil(s): Check what is best for your notebooks (e.g., Rite in the Rain often works best with pencil).

-Clipboard (*recommended): Good to have a hard surface for writing in your journals and for securing paper in the wind.

-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.

VIII. Academic Schedule & Course Content

Below is an example model of the course that showcases the academic content that will be covered during the Chile program. A more detailed academic schedule will be emailed to students prior to the start of the program.

Dates (2024)	Location	Academic Themes	Reading Discussions	Assignments Due
	Site 1	Overview of Chile and Early Settlement Introduction to Natural History How to Read Scientific Articles Intro to Field Sampling Techniques/Types of Data Intro to Marine Debris Tides Spanish Basics	Readings 1 - 5	
	Site 2	Plate Tectonics Volcano Dynamics Magma Types Ecological Succession	Readings 6 - 8	
	Site 3	Estuary and Fjord Dynamics Phytoplankton and Zooplankton Harmful Algal Blooms Fisheries/Aquaculture in Chile	Readings 9 - 11	Journal Review
	Site 4	Atmospheric Circulation and Climate Zones Patagonian Habitat Types Biogeography Flora and Fauna Adaptations Environmental Disturbances Ecosystem Threats Climate Change Basics Carbon Cycling River Systems Mapuche Culture and Traditions Agriculture in Patagonia	Readings 12 - 17	Field Quiz
	Site 5	Human Connection to the Land Land Management and the Concept of Wilderness Glacier Processes Energy in Chile	Readings 18 - 19	Journal Review
	Site 6	Scientific Process and Analysis	Reading 20	
	Site 7	Science in the Antarctic Carbon Pumps	Readings 21 - 22	Field Quiz
	Site 8	Oceanic Circulation Coastal Ecosystems Climate Dynamics Climate Threats (Warming, Acidification, Sea Level)	Readings 23 - 27	Research Projects C Final

	Site 9	Future of Patagonia Reflecting on Key Concepts Final Assignments	Reading 28	A/B Finals Final Journal Review Marine Debris Lab Report
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IX. Reading List

The course reader, including the readings listed below, will be compiled and emailed to students in advance of the program. Additional readings and guidebooks will be carried in a shared library.

R1: Parker A (2007) *Natural History and Naturalist Skills*.

R2: Purugganan M, Hewitt J (2004) *How to Read a Scientific Article*. Rice University.

R3: *Field Sampling Techniques: Fact Sheet*. LiMPETS Rocky Intertidal Monitoring Program: Curriculum Guide.

R4: Fuentes-Olivares P, Muñoz-Ramírez CP (2018) On the seasonal abundance of two coexisting species of *Ceroglossus* ground beetle (Coleoptera: Carabidae) from the Katalapi park, south Chile. *Revista Chilena de Entomología* 44(1):15-21

R5: Hinojosa IA, Thiel M (2009) Floating Marine Debris in Fjords, Gulfs and Channels of Southern Chile. *Marine Pollution Bulletin* 58:341-350.

R6: Hayes JL, Deligne NI, Bertin L, Calderson R, Wardman JB, Wilson TM, Leonard GS, Stewart C, Wallace KL, Baxter PJ (2019) Impacts of the 2015 eruption of Calbuco volcano on Chilean infrastructure, utilities, agriculture, and health. *Lower Hutt (NZ): GNS Science*. 102 p doi:10.21420/02YC-VX66

R7: Hintz L, Fischer D, Ferrari N, Crisafulli CMS (2021) Vegetation dynamics under residual large trees following a volcanic eruption in a Valdivian temperate rainforest. *Plant Ecol*. 222:915-931

R8: Bertin LJ, Christie DA, Sheppard PR, Muñoz AA, Lara A, Alvarez C (2021) Chemical Signals in Tree Rings from Northern Patagonia as Indicators of Calbuco Volcano Eruptions since the 16th Century. *Forests* 12:1305. doi:10.3390/f12101305

R9: Pantoja S, Iriarte JL, Daneri G (2011) Oceanography of the Chilean Patagonia. *Continental Shelf Research* 31:149-153

R10: Díaz PA, Álvarez G, Varela D, Pérez-Santos I, Díaz M, Molinet C, Seguel M, Aguilera-Belmonte A, Guzmán L, Uribe E, Rengel J, Hernández C, Segura C, Figueroa RI (2019) Impacts of harmful algal blooms on the aquaculture industry: Chile as a case study. *Perspectives in Phycology*. doi: 10.1127/pip/2019/0081

R11: Quiñones RA, Fuentes M, Montes RM, Soto D, León-Muñoz J (2019) Environmental issues in Chilean salmon farming: a review. *Reviews in Aquaculture* 11:375-402

R12: Hayes M (2009) Into the Field: Naturalist Education and the Future of Conservation. *Conservation Biology*. 23(5):1075-1079

R13: Tecklin D, DellaSalla DA, Luebert F, Plischoff P (2011) Valdivian Temperate Rainforests of Chile and Argentina. *Temperate and Boreal Rainforests of the World: Ecology and Conservation*. 132-153

R14a: Morton (2018) Residual Strain Explains Later Quakes. *Earth*. Accessed 11/28/22.

R14b: Kronmüller E, Atallah DG, Gutiérrez I, Guerrero P, Gedda M (2017) Exploring indigenous perspectives of an environmental disaster: Culture and place as interrelated resources for remembrance of the 1960 mega-earthquake in Chile. *International Journal of Disaster Risk Reduction* 23:238-247

R15: Howe JP (2015) This is Nature; This is Un-Nature: Reading the Keeling Curve. *Environmental History*. 20:286-293.

R16: Metcalf JL, Turney C, Barnett R, Martin F, Bray SC, Vilstrup JT, Orlando L, et al. (2016) Synergistic roles of climate warming and human occupation in Patagonian megafaunal extinctions during the Last Deglaciation. *Scientific Advances*. 2(6) e1501682. doi:10.1126/sciadv.1501682

R17: Novaro AJ, Walker RS (2021) Lessons of 15,000 Years of Human-Wildlife Interaction for Conservation in Patagonia in the 21st Century. *Diversity* 13:633.

R18: Paul F, Mölg N (2014) Hasty retreat of glaciers in northern Patagonia from 1985 to 2011. *Journal of Glaciology*. 60(224):1033-1043

R19: Milner AM, Khamis K, Battin TJ, Brittain JE, Barrand NE, Fureder L (2017) Glacier Shrinkage driving Global Changes in Downstream Systems. *Proceedings to the National Academy of Science* 1-9

R20: Bentley J (2018) *Wicked Problems: An Idea whose Time has Come*.

R21: Willson MF, Armesto JJ (1996) The natural history of Chiloé: on Darwin's trail. *Revista Chilena de Historia Natural*. 69:149-161

R22: Falkowski P (2012) The Power of Plankton. *Nature* 483:S17-19.

R23: Försterra G, Häussermann V, Laudien J (2016) Animal Forests in the Chilean Fjords: Discoveries, Perspectives and Threats in Shallow and Deep Waters. *Marine Animal Forests*. P 1-35 doi:10.1007/978-3-319-17001-5_3-1

R24: Thiel M, Hinojosa I, Vásquez N, Macaya E (2003) Floating marine debris in coastal waters of the SE-Pacific (Chile). *Marine Pollution Bulletin* 46:224-231

R25: Skewgar E, Simeone A, Boersma PD (2009) Marine Reserve in Chile would benefit penguins and ecotourism. *Ocean & Coastal Management* 52:487-491

R26: Reyes-Arriagada R, Hiriart-Bertrand L, Riquelme V, Simeone A, Pütz K, Lüthi B, Rey AR (2013) Population Trends of a Mixed-Species Colony of Humboldt and Magellanic Penguins in Southern Chile after Establishing a Protected Area. *Avian Conservation and Ecology* 8(2):13

R27: Luna JP, de Barros BF (2021) US Engagement in Chile: US Support for Conserving Parks and Nature Reserves in Chile. *Center for Latin American & Latino Studies*.

R28: Laszlo KC (2012) From Systems Thinking to Systems Being: The Embodiment of Evolutionary Leadership. *Journal of Organizational Transformation & Social Change* 9(2): 95-108