

CENTER FOR ENVIRONMENTAL STUDIES

COASTAL AND OCEAN STUDIES

Chair: Professor Rónadh Cox

Coastal and Ocean Studies Advisory Committee: Professors: S. Jacobson, C. Thorne. Associate Professors: J. Constantine, T. Pusack. Assistant Professor: S. Zepeda. Mystic Executive Director: T. Van Winkle.

CONCENTRATION IN COASTAL AND OCEAN STUDIES

Understanding the oceans, the coasts, and our interactions with both is critical in this era of climate change, sea-level rise, fisheries crises, and the internationalization of the high seas. The oceans control the planet's weather, they supply about 20% of the world's food, and ocean-going cargo ships carry 90% of international trade goods. More than a third of the global population lives within some tens of kilometers of the coast, and about 10% of the world's people could be directly impacted by sea level rise in the coming decades. Williams run the [Williams-Mystic Program](#), one of the nation's few interdisciplinary semesters investigating the multifaceted ocean and coastal system via the humanities, social sciences, and physical sciences; and Coastal and Ocean Studies (CaOS) provides an on-campus structure for students to weave the Williams-Mystic curriculum into an interdisciplinary concentration.

Candidates for the concentration in Coastal and Ocean Studies must complete a minimum of seven courses: the four Williams-Mystic courses (which cover history, literature, science, and policy of the coasts and oceans); an oceanography course, an elective, and a 400-level Senior Seminar. The Williams-Mystic courses require a semester away at the Williams-Mystic Program, and the remainder of the concentration is completed on campus.

Students who have completed other study-away programs that emphasize marine studies should consult with the program chair about the possibility of completing the Coastal and Ocean Studies concentration. [More information can be found on the Coastal and Ocean Studies web page](#), and the CaOS curriculum is summarised on [this information sheet](#).

Course requirements (7 courses in all)

One foundational oceanographic course from the following list:

CAOS/ENVI/GEOS 104 Oceanography

CAOS/GEOS 110/ENVI 109 Oceans and Society

CAOS/GEOS 201 Oceanographic Processes

Four core courses across the humanities, science, and social sciences (taken at Williams-Mystic):

CAOS/ENGL 231 Literature of the Sea

CAOS 311/BIOL 231 Marine Ecology OR CAOS/GEOS 210 Oceanographic Processes

CAOS/ENVI 351/ PSCI 319 Marine Policy

CAOS/HIST 352 America and the Sea, 1600-Present

One capstone Course

ENVI/CAOS 412 Senior Seminar: Perspectives on Environmental Studies

Elective Courses to bring the total to 7

A number of elective courses are available across the disciplinary spectrum, based on either a clear coastal and ocean statement in the course description or broad practical/theoretical applicability to coastal and ocean studies. Concentrators will take a minimum of one course from the list below. Students using CAOS/GEOS 201 Oceanographic Processes at Williams Mystic to meet their foundational oceanographic course requirement will need to take two electives to meet the seven-course requirement. If concentrators find other courses in the catalog that they believe meet the requirements for a CAOS elective, they may bring them to the attention of the Chair.

[GEOS 110 / ENVI 109 / CAOS 110 LEC Oceans and Society](#)

Taught by: [Rónadh Cox](#)
[Catalog details](#)

INDEPENDENT STUDY

The following courses are offered for students pursuing CaOS research, and they may be used as electives for the concentration:

CAOS 397, 398 Independent Study: Coastal and Ocean Studies

HONORS IN COASTAL AND OCEAN STUDIES

Candidates for honors in Coastal and Ocean Studies will complete a thesis project in their senior year, involving original research under the supervision of a faculty advisor (archive, museum, field, or laboratory) followed by analysis and write-up of results. The work may be a continuation and expansion of Williams-Mystic research or may be a new and separate project. The research duration may either be one semester plus a winter study, or a full year (two semesters plus winter study). Data collection during the summer before the senior year may be necessary in some cases. Honors will be awarded if the thesis shows a high degree of scholarship, originality, and intellectual insight.

CAOS 100 (S) Introduction to Weather and Climate (QFR)

Cross-listings: GEOS 100

Secondary Cross-listing

How is it that we have such a hard time predicting if it's going to rain next week, but we can be confident in projections of future climate change decades from now? This course will explore how fundamental laws of physics determine why air moves and changes, creating the wind, clouds, precipitation, and extreme events that form our weather. Building off of our understanding of the atmosphere, we'll look at longer time scales to develop an understanding of earth's climate system, global heat and moisture transport, climate change, and the ways that humans can change our planet. We will use weather and climate models to learn how scientists and meteorologists predict future conditions. Labs include benchtop experiments, data analysis projects, and self-scheduled meteorological observations. This course is in the Oceans and Climate group for the Geosciences major.

Requirements/Evaluation: weekly problem sets, lab assignments, midterm exam, and final exam

Prerequisites: none

Enrollment Limit: 60

Enrollment Preferences: first year and second year students, Geosciences majors

Expected Class Size: 60

Grading: yes pass/fail option, yes fifth course option

Distributions: (D3) (QFR)

This course is cross-listed and the prefixes carry the following divisional credit:

GEOS 100(D3) CAOS 100(D3)

Quantitative/Formal Reasoning Notes: This course will have regular problem sets which require substantial quantitative reasoning. Labs will require analysis, presentation, and explanation of quantitative data, and exams will require some quantitative problem solving.

Attributes: ENVI Natural World Electives EXPE Experiential Education Courses

Not offered current academic year

CAOS 104 (F) Oceanography

Cross-listings: ENVI 104 / GEOS 104

Secondary Cross-listing

The oceans cover three quarters of Earth's surface, yet oceanography as a modern science is relatively young: the first systematic explorations of the geology, biology, physics and chemistry of the oceans began in the late 19th century. This introduction to ocean science includes the creation and destruction of ocean basins with plate tectonics; the source and transport of seafloor sediments and the archive of Earth history they contain; currents, tides, and waves; photosynthesis and the transfer of energy and matter in ocean food webs; the composition and origin of seawater, and how its chemistry traces biological, physical and geological processes; oceans and climate change; and human impacts.

Class Format: two 75-minute lecture/discussion meetings each week; 2-hour lab every second week; one all-day field trip to the Atlantic coast of New England.

Requirements/Evaluation: lab activities, homework, reading-comprehension quizzes, three tests

Prerequisites: none

Enrollment Limit: 48

Enrollment Preferences: first year and second year students, Geosciences majors, Maritime Studies concentrators

Expected Class Size: 48

Grading: yes pass/fail option, yes fifth course option

Unit Notes: This course and GEOS 110 Oceans and Society cannot both be taken for credit.

Distributions: (D3)

This course is cross-listed and the prefixes carry the following divisional credit:

ENVI 104(D3) GEOS 104(D3) CAOS 104(D3)

Attributes: ENVI Natural World Electives EXPE Experiential Education Courses

Fall 2024

LEC Section: 01 TR 9:55 am - 11:10 am Chris Halsted

LAB Section: 02 T 1:00 pm - 3:00 pm Chris Halsted

LAB Section: 03 W 1:00 pm - 3:00 pm Chris Halsted

CAOS 110 (F) Oceans and Society

Cross-listings: GEOS 110 / ENVI 109

Secondary Cross-listing

Oceans impact society in many ways: they provide much of our protein, they hide untapped mineral wealth, their circulation regulates global climate, they transport and accumulate our plastic garbage, marine storms batter coastal infrastructure, and sea-level rise threatens communities. However, despite the oceans' importance throughout history--for trade, as a source of food, and because of their unpredictable dangers--we know shockingly little about them. More than 6000 people have reached the summit of Everest, Earth's highest elevation; but only 22 have visited Challenger Deep, the deepest point below the ocean surface. We have mapped the surfaces of Mars and Venus in far more detail than the topography of Earth's ocean basins. New marine organisms are discovered regularly. And we still don't fully understand the complex details of how ocean and atmosphere work together as the planet's climate engine. In this course, you will examine ocean science themes with direct societal relevance that are also at the forefront of scientific investigation. Topics will be selected based on current events, but are likely to include deep sea mining, meridional overturning, sea level rise, atmospheric rivers, and aquaculture. By taking focused dives into a range of subjects you will learn about the evolution and operation of the ocean as a physical and geological system as well as investigating the intersections between ocean functions, climate change, and human societies. Exercises and discussions will foreground active learning. A field trip to the Atlantic coast will integrate experiential investigation of the intersection between coastal change, extreme weather, and communities. The aim is to have energised interdisciplinary discussions about topics of pressing societal relevance, to understand some of the fundamentals of ocean science, to develop expertise in gathering and distilling information by researching new topics, and thereby to improve critical and analytical thinking.

Class Format: Two 75-minute lecture/discussion meetings each week; 2-hour lab every second week; one all-day field trip to the Atlantic coast.

Requirements/Evaluation: Evaluation is based on engagement with in-class activities, six graded lab exercises, four short writing/research assignments, and a five-page term paper

Prerequisites: none

Enrollment Limit: 60

Enrollment Preferences: First year and second year students

Expected Class Size: 60

Grading: yes pass/fail option, yes fifth course option

Unit Notes: This course and GEOS 104 Oceanography cannot both be taken for credit.

Distributions: (D3)

This course is cross-listed and the prefixes carry the following divisional credit:

GEOS 110(D3) CAOS 110(D3) ENVI 109(D3)

Attributes: CAOS Interdepartmental Electives ENVI Natural World Electives EXPE Experiential Education Courses

Not offered current academic year

CAOS 134 (F) The Tropics: Biology and Social Issues (DPE)

Cross-listings: BIOL 134

Secondary Cross-listing

Biology and Social Issues of the Tropics explores the biological dimensions of social and environmental issues in tropical societies, focusing specifically on the tropics of Africa, Asia, Latin America, Oceania, and the Caribbean. Social issues are inextricably bound to human ecologies and their environmental settings. Each section of the course provides the science behind the issues and ends with options for possible solutions, which are debated by the class. The course highlights differences between the tropics and areas at higher latitudes while also emphasizing global interconnectedness. It begins with a survey of the tropical environment, including a global climate model, variation in tropical climates and the amazing biodiversity of tropical biomes. The next section focuses on human population biology, and emphasizes demography and the role of disease particularly malaria, AIDS and Covid-19 (SARS-CoV-2). The final part of the course covers the place of human societies in local and global ecosystems including the challenges of tropical food production, the interaction of humans with their supporting ecological environment, and global climate change. This course fulfills the DPE requirement. Through lectures, debates and readings, students confront social and environmental issues and policies from the perspective of biologists. This builds a framework for lifelong exploration of human diversity in terms of difference, power and equity.

Class Format: Debate

Requirements/Evaluation: two hour exams, a short paper, debate presentation, and a final exam

Prerequisites: none

Enrollment Limit: 62

Enrollment Preferences: Preference will be given to Environmental Studies majors/concentrators, students in need of a Division III or DPE requirement, and then Seniors, Juniors, Sophomores, and First Year students.

Expected Class Size: 62

Grading: no pass/fail option, no fifth course option

Unit Notes: Does not count for credit in the Biology major.

Distributions: (D3) (DPE)

This course is cross-listed and the prefixes carry the following divisional credit:

BIOL 134(D3) CAOS 134(D3)

Difference, Power, and Equity Notes: This course highlights differences between the tropics and higher latitudes. For each section we focus on difference--different natural habitats and biodiversity, different patterns of population growth, different human disease profiles, different types of agriculture and different contributions to and impacts of climate change. For each section we highlight differences in power and the inequities of resource distribution. We then debate potential solutions to ameliorate these inequities.

Attributes: ENVI Natural World Electives GBST African Studies PHLH Biomedical Determinants of Health

Not offered current academic year

CAOS 206 Marine Biology

The oceans impact almost all life and processes on Earth. In this course we will explore the astounding diversity of life in the world's oceans, from the smallest photosynthetic microbes on the planet to the largest animals that weigh almost 200 tons. Using an integrative approach that spans from the molecular to the organismal to the ecological levels, we will focus on the biology of marine organisms, and their interactions and interrelationships. Topics including primary production, reproduction, acclimation to stresses, adaptation, and evolution will be discussed in the context of environments such as the open oceans, coastal waters, rocky intertidal zones, coral reefs, and the deep sea. We will emphasize how recent scientific advances have revolutionized our understanding of marine organisms and explore solutions to global challenges, including climate change and ocean acidification, pollution, sustainable fishing and aquaculture, and habitat conservation.

Requirements/Evaluation: two exams, one two-page research paper, one final project with a three-page written component and an oral presentation component, participation in discussions, laboratory assignments

Prerequisites: Biology 101 and Biology 102, or permission of instructor

Enrollment Limit: 20

Enrollment Preferences: Biology majors: seniors who need a second 200-level course for the major, and then juniors who need a second 200-level course for the major

Expected Class Size: 20

Grading:**Distributions:** (D3)

Not offered current academic year

CAOS 210 (F)(S) Oceanographic Processes**Cross-listings:** GEOS 210**Primary Cross-listing**

Part of the Williams-Mystic Coastal and Ocean Studies Program, this course provides an introduction to physical, geological, chemical, and biological oceanography. Using local field sites as well as places visited on field seminars, we will investigate why the Earth has oceans, why they are salty, how they move and flow, reasons for sea level change on both long and short timescales, and how our oceans interact with the atmosphere to control global climate. We will emphasise societal interactions with the ocean, and will consider coastal processes including land loss. We will apply an environmental justice and anti-racist lens to our discussions. Field work will take place on shores in southern New England, as well as during field seminars on the Atlantic ocean, the West Coast and the Mississippi River Delta. This course is in the Oceans and Climate group for the Geosciences major.

Class Format: Flipped classroom will focus on active learning using data-based exercises. Mini-symposia will involve student research and discussion.

Requirements/Evaluation: graded lab exercises, mini-symposium participation, and a research project

Prerequisites: none

Enrollment Limit: 24

Enrollment Preferences: none

Expected Class Size: 10

Grading: no pass/fail option, no fifth course option

Unit Notes: This course is taught at our Mystic Seaport campus. Students must be enrolled in the Williams-Mystic Coastal and Ocean Studies Program.

Distributions: (D3)

This course is cross-listed and the prefixes carry the following divisional credit:

CAOS 210(D3) GEOS 210(D3)

Attributes: ENVI Natural World Electives EXPE Experiential Education Courses GEOS Group A Electives - Climate + Oceans

Fall 2024

LEC Section: 01 TR 9:00 am - 10:15 am Lloyd B. Anderson

LAB Section: 02 TR 1:00 pm - 4:30 pm Lloyd B. Anderson

Spring 2025

LEC Section: 01 TR 9:00 am - 10:15 am Lloyd B. Anderson

LAB Section: 02 TR 1:00 pm - 4:30 pm Lloyd B. Anderson

CAOS 212 Paleobiology

The fossil record is a direct window into the history of life on Earth and contains a wealth of information on evolution, biodiversity, and climate change. This course investigates the record of ancient life forms, from single-celled algae to snails to dinosaurs. We will explore how, why, when, and where fossils form and learn about the major groups of fossilized organisms and how they have changed through time. In addition, we will cover a range of topics central to modern paleobiology. These include: how the fossil record informs our understanding of evolutionary processes including speciation; the causes and consequences of mass extinctions; how fossils help us tell time and reconstruct the Earth's climatic and tectonic history; statistical analysis of the fossil record to reconstruct biodiversity through time; analysis of fossil morphology to recreate the biomechanics of extinct organisms; and using fossil communities to reconstruct past ecosystems. Laboratory exercises will take advantage of Williams' fossil collections as well as published datasets to provide a broad understanding of fossils and the methods we use to study the history of life on Earth, including using the programming language R (no previous experience is required). We will also view a diversity of fossils in their geologic and paleo-environmental context on our field trip to Eastern New York. This course is in the Sediments and Life group for the Geosciences major.

Class Format: One day field trip to the the Paleozoic of New York State

Requirements/Evaluation: Weekly lab assignments, frequent short quizzes and writing assignments, and a final research project presented in poster form.

Prerequisites: any 100-level GEOS course or BIOL 102, 203 or 205

Enrollment Limit: 24

Enrollment Preferences: sophomores, and junior GEOS majors

Expected Class Size: 20

Grading:

Unit Notes: does not satisfy the distribution requirement for the Biology major

Distributions: (D3)

Attributes: EXPE Experiential Education Courses GEOS Group B Electives - Sediments + Life

Not offered current academic year

CAOS 213 (S) Introduction to Environmental and Natural Resource Economics (QFR)

Cross-listings: ECON 213 / ENVI 213

Secondary Cross-listing

We'll use economics to provide one perspective on reasons humans harm the environment and overuse natural resources, and what we can do about it. We'll study climate change, pollution in general, cost benefit analysis, environmental justice, natural resources (like fisheries, forests, and fossil fuels), and energy. We'll talk about how economists put a dollar value on nature and ecosystem services (as well as human health and life!), and the concerns people may have about doing so. We will take an economic approach to global sustainability, and study the relationship between the environment and economic growth. Consideration of justice and equity will be woven throughout the whole semester.

Requirements/Evaluation: problem sets, short essays, final paper; intermediate assignments may include a poster, one or more short presentation(s), other brief writing assignment(s)

Prerequisites: ECON 110 or equivalent

Enrollment Limit: 30

Enrollment Preferences: first-year and sophomore students

Expected Class Size: 30

Grading: yes pass/fail option, yes fifth course option

Unit Notes: this course will count toward both the Environmental Studies major and concentration

Distributions: (D2) (QFR)

This course is cross-listed and the prefixes carry the following divisional credit:

ECON 213(D2) ENVI 213(D2) CAOS 213(D2)

Quantitative/Formal Reasoning Notes: We will use formal theory expressed in math and graphs, perform calculations, and consume statistical data.

Attributes: ENVI Environmental Policy EVST Social Science/Policy POEC Depth

Spring 2025

LEC Section: 01 MWF 8:30 am - 9:45 am Sarah A. Jacobson

CAOS 215 (S) Climate Changes (QFR)

Cross-listings: GEOS 215

Secondary Cross-listing

Paleoclimatology is the reconstruction of past climate variability and the forces that drove the climate changes. The Earth's climate system is experiencing unprecedented and catastrophic change because of anthropogenic emission of greenhouse gases and land use change.

Paleoclimatology allows humans to put modern climate changes into the context of the history of this planet, and shows how and why it is unprecedented and catastrophic. Each climate event we study from Earth's past teaches us lessons on why the climate system responds to

anthropogenic perturbations, what climate changes we're committed to in the future, how long-lasting they will be, and what climate consequences we

can avoid if we take action and reduce greenhouse gas emissions sooner. In this course, we will discuss the major mechanisms that cause natural climate variability, how climate of the past is reconstructed, and how climate models are used to test mechanisms that drive climate variation. With these tools, you will analyze and interpret data and model simulations from climate events from Earth's history, and apply these findings to anthropogenic climate changes happening now and that are projected to happen in the future. Laboratories and homework will emphasize developing problem solving skills as well as sampling and interpreting geological archives of climate change. This course is in the Oceans and Climate group for the Geosciences major.

Class Format: This class has three scheduled lectures per week, and one lab meeting per week which will consist of field excursions, lab exercises, problem solving and discussion

Requirements/Evaluation: lab exercises and homework (25%), three quizzes (50%), and a final project (25%)

Prerequisites: 100-level course in GEOS, CHEM, or PHYS or ENVI 102 or permission of instructor

Enrollment Limit: 24

Enrollment Preferences: Geosciences majors and Environmental Studies majors and concentrators and Maritime Studies concentrators

Expected Class Size: 16

Grading: yes pass/fail option, yes fifth course option

Distributions: (D3) (QFR)

This course is cross-listed and the prefixes carry the following divisional credit:

GEOS 215(D3) CAOS 215(D3)

Quantitative/Formal Reasoning Notes: Labs and homework include quantitative problem solving, visualization and analysis of quantitative data, and scientific computing with Matlab. No previous programming experience is assumed.

Attributes: ENVI Natural World Electives EVST Environmental Science EXPE Experiential Education Courses GEOS Group A Electives - Climate + Oceans

Not offered current academic year

CAOS 216 (F) Globalization

Cross-listings: GBST 315 / ECON 215

Secondary Cross-listing

This course will examine the causes and consequences of globalization. This includes studying topics such as trade, immigration, foreign direct investment, and offshoring. The impact of these forms of globalization on welfare, wages, employment, and inequality will be a focal point. Throughout we will rely on economic principles, models, and empirical tools to explain and examine these contentious issues.

Class Format: discussion

Requirements/Evaluation: problem sets, two midterms, and a final paper and presentation

Prerequisites: ECON 110

Enrollment Limit: 25

Expected Class Size: 25

Grading: no pass/fail option, no fifth course option

Distributions: (D2)

This course is cross-listed and the prefixes carry the following divisional credit:

GBST 315(D2) ECON 215(D2) CAOS 216(D2)

Attributes: GBST Economic Development Studies POEC Depth

Fall 2024

LEC Section: 01 TR 8:30 am - 9:45 am Will Olney

LEC Section: 02 TR 9:55 am - 11:10 am Will Olney

CAOS 218 (F) Capital and Coercion (DPE)

Cross-listings: ECON 218

Secondary Cross-listing

Capital, tradable ownership shares in long-lived corporations, invented in the 17th century, has connected people of different races, religions, and geographies. There are huge profits from such economic interactions, but also risks: of being cheated, deceived, or coerced. This course uses insights from the economics of incentives (principal-agent models, contracts, mechanism design) to investigate the interplay between capital, coercion, and resistance. The role of prejudice will be central, as will the rise of middlemen as enforcers of coercion. Case studies span the 17th century to the 20th and include: the spice trade and conflict in the Indian Ocean, capital markets and fraud in Amsterdam and London, the Atlantic trade in enslaved people, the Dutch "cultivation system" in Java, the slow end of slavery in Brazil, and colonial control and independence in Kenya. Required readings for this class will include primary historical sources, and even excerpts from autobiographical novels!

Requirements/Evaluation: Students will be evaluated based on weekly reading responses, class participation, a midterm and a final.

Prerequisites: Econ 110

Enrollment Limit: 15

Enrollment Preferences: If overenrolled, students will be asked to submit a short statement of interest.

Expected Class Size: 15

Grading: no pass/fail option, no fifth course option

Distributions: (D2) (DPE)

This course is cross-listed and the prefixes carry the following divisional credit:

CAOS 218(D2) ECON 218(D2)

Difference, Power, and Equity Notes: This course analyzes the evolution of economic inequity. It analyzes how global market opportunities have been shaped by race, religion, wealth, and power.

Attributes: GBST Economic Development Studies POEC Depth

Not offered current academic year

CAOS 231 (F)(S) Literature of the Sea (DPE)

Cross-listings: ENGL 231

Primary Cross-listing

The ocean, and human relationships with it, have been central features of literatures and cultures around the world for more than a thousand years. But since literary study is typically based around authors' homelands, careful examination of the oceanic experience is often pushed to the periphery--an "empty space" to be crossed between nations, a "vast darkness" antithetical to human life, or a mirror for land-borne concerns. Increasingly, however, scholars and readers are centering the sea and stories about it as a means stepping outside human frameworks of space and time, situating the complex emotions and narratives inspired by the ocean into a complex network of geologic history and teeming other-than-human life. This course examines a wide range of texts and perspectives on the ocean and human relationships with it. Doing so will help us consider how literature both plays into and subverts dominant viewpoints of the ocean. Through texts that consider 19th-century whaling, the Middle Passage, the postcolonial Caribbean, and islands throughout the Pacific Ocean, we will explore a range of questions, including: What can we learn from examining efforts to write about the ocean? How do ocean stories help individuals understand themselves, their communities, and their place in global environments? What can the range of cultural and literary perspectives on our "single, global ocean" reveal about the ways different people are both connected with and profoundly distant from each other? Most importantly, we will practice, as a classroom community, different strategies for carefully reading texts while connecting them to cultural traditions, surrounding environments, and personal experiences.

Class Format: weekly roundtable discussions, including coastal and near-shore field trips and multiple field seminars.

Requirements/Evaluation: regular papers, class participation, journal-writing, and a final assignment

Prerequisites: N/A

Enrollment Limit: 25

Enrollment Preferences: Williams-Mystic Students only

Expected Class Size: 20

Grading: no pass/fail option, no fifth course option

Unit Notes: offered only at Mystic Seaport

Distributions: (D1) (DPE)

This course is cross-listed and the prefixes carry the following divisional credit:

CAOS 231(D1) ENGL 231(D1)

Difference, Power, and Equity Notes: This course focuses on the range of cultural perspectives about the sea, as well as the ways those perspectives can unsettle and challenge dominant narratives about the sea and its role in colonial expansion. Furthermore, this course centers voices that are typically overlooked in the genre of "Sea Literature," paying particular attention to Indigenous and African-American narratives about the ocean.

Attributes: AMST Arts in Context Electives ENVI Humanities, Arts + Social Science Electives

Fall 2024

SEM Section: 01 MW 10:30 am - 11:45 am Ned G. Schaumberg

Spring 2025

SEM Section: 01 MW 10:30 am - 11:45 am Ned G. Schaumberg

CAOS 234 Francophone Oceania: The Other Side of the Postcard

Manava i Te Ao Ma'ohi! Tongan-Fijian author Epeli Hau'ofa writes: "Centuries before Europeans entered the Pacific, in the days when boundaries were not imaginary lines in the ocean but points of entry that were constantly negotiated and even contested, the sea was open to anyone who could navigate a way through." Of critical importance to Oceanian communities and scholarship today is the project of remembering and re-membering the stories, knowledges, travel routes, and more-than-human ecologies that have crisscrossed the vast aqueous landscapes of this "other" side of the globe. This course is a comprehensive survey of the literature, modern history, and aesthetics that inform the field of contemporary Francophone Oceanian Studies. Major concepts in Indigenous Oceanian philosophy and genealogies of thought (from Ma'ohi, Kanak, and Ni-Vanuatu communities in particular), European imperialism and racial politics, gender and sexuality, maritime knowledges, the French nuclear agenda and climate fiction will be studied. Students will use multimedia formats and storytelling techniques to cross-examine narrative development, philosophy, and Oceanian history from a comparative perspective. Texts may include: Déwé Gorodé's *Sous les cendres des conqués* (1985), Chantal T. Spitz's *L'île des rêves écrasés* (1991), Claudine Jacques' *L'Âge du perroquet-banane, Parabole païenne* (2002), Ari'irau's *Matamimi ou la vie nous attend* (2006), Nicholas Kurtovitch's *Dans le ciel splendide* (2015), Titaua Peu's *Pina* (2016), and Titaua Porcher's *Hina, Maui et compagnie* (2018) among others. Conducted in French.

Requirements/Evaluation: Evaluation will be based on active participation and preparation, two short presentations, a guided journal, and a final project.

Prerequisites: RLFR 105 or 106; or results of the College Placement exam; or permission of Instructor.

Enrollment Limit: 20

Enrollment Preferences: French majors and certificate holders

Expected Class Size: 15

Grading:

Distributions: (D1)

Not offered current academic year

CAOS 269 (F) Environmental Law and Policy

Cross-listings: ENVI 269

Secondary Cross-listing

America's environmental statutes, regulations, legal precedents, and policies have grown in complexity over the last 75 years. These bi-partisan, broadly supported laws also shaped environmental laws and policies in the European Union, China, the Middle East, and countries in the Global South. Yet in 2024, America is no longer a global leader in climate mitigation or environmental protection. As legal and policy solutions to environmental problems continue to evolve based on values, science, market dynamics, and increasing climate change impacts, it is important to study this complex legal landscape to understand where opportunities lie for more ambitious and just solutions to complex environmental problems. This class surveys major environmental laws and policies by looking at cases of current, complex environmental problems. This course will focus not only on the hallmark American environmental laws, regulations, and policies but also on the interplay of state and tribal law, food, water, mineral, energy, tax, and animal rights law issues, and international treaties and climate agreements. By the completion of the semester, students will understand both the successes and failures of modern environmental law. In addition to learning about the substantive legal issues covered in the

course, students will develop legal research skills associated with researching statutes and regulations and interpreting judicial decisions. This course will help students interested in future work in law or policy understand how to analyze cases, regulations, and policy, and see opportunities for future solutions.

Requirements/Evaluation: 1) Class Participation (leading discussion and presenting materials) 20%; 2) Weekly 300-word Case Briefs 30%; 3) Comparative Law/Policy Analysis (5-7 page research paper) 30%; 4) Final Exam 20%

Prerequisites: ENVI 101 or permission of instructor

Enrollment Limit: 25

Enrollment Preferences: Preference to Environmental Studies majors and concentrators and sophomores and above.

Expected Class Size: 25

Grading: no pass/fail option, yes fifth course option

Distributions: (D2)

This course is cross-listed and the prefixes carry the following divisional credit:

ENVI 269(D2) CAOS 269(D2)

Attributes: AMST Space and Place Electives ENVI Environmental Policy EVST Social Science/Policy JLST Interdepartmental Electives POEC Depth

Fall 2024

LEC Section: 01 TF 2:35 pm - 3:50 pm Lindi von Mutius

CAOS 275 Ocean and Climate Changes

Earth's oceans are a central part of the global climate system, and changes to the oceans throughout Earth's history were often accompanied by dramatic climate shifts. In this class we will discuss the interconnected nature of oceans and climate, evidence for ocean and climate changes in the geologic past, what is happening to the oceans today, and what may happen in the future due to human-induced climate change. We will use computer models to explore ocean circulation in three dimensions, examine societal case studies to appreciate how people rely on the oceans, and analyze articles from the scientific literature to learn about the origins of foundational oceanographic knowledge and modern advances. Using marine sediment records, we will synthesize paleoclimate data and reconstruct past changes in the ocean and climate system. Through these explorations you will learn about the influence of the oceans on the global carbon system over both short and long timescales, and how changes in ocean circulation have altered Earth's energy balance. Using modern satellite data, we will investigate changes happening in the world's oceans today and assess the mechanisms thought to be responsible. We will visit a dedicated ocean research facility to learn about the tools and techniques employed by oceanographers to answer questions about our changing oceans. And, with the aid of emissions scenarios and probabilistic models, we will explore future scenarios of climate change and evaluate how the oceans will be affected by, and will in turn influence, the changing climate system.

Requirements/Evaluation: 2 lectures per week, one 3 hour lab per week. Students should expect to spend about 7 additional hours per week out of class working on course-related reading/homework/studying/project preparation. Readings, podcasts, and/or videos before most lecture and some lab meetings. Short, check-in quizzes.

Prerequisites: one 100-level GEOS course

Enrollment Limit: 24

Enrollment Preferences: sophomores, and junior Geos majors

Expected Class Size: 24

Grading:

Distributions: (D3)

Attributes: GEOS Group A Electives - Climate + Oceans

Not offered current academic year

CAOS 279 (S) Islam on the Indian Ocean

Cross-listings: REL 279 / ASIA 279 / ARAB 279

Secondary Cross-listing

While colonial and Eurocentric geographies speak in terms of continental separation, historically the continents of Africa and Asia have been

connected to one another through a dual link: Islam and the Indian Ocean. Indian Ocean trade and travel have historically connected East Africa, the Arabian Peninsula, South Asia, and South East Asia, shaping the lives of people and communities who lived not only along the coasts but also inland. This course focuses on these transregional connections, looking at the Indian ocean as a connective space that binds people and regions together rather than separating them. The course will also examine the role of Islam as a religious, economic, social and political force that brought together Muslim communities throughout the regions along the Indian ocean. In exploring these connections, the course will cover a broad historical period, from the 7th century with the rise of Islam to European colonialism and the emergence of a global economy in the nineteenth century.

Requirements/Evaluation: weekly responses, midterm essay, final paper

Prerequisites: none

Enrollment Limit: 15

Enrollment Preferences: majors

Expected Class Size: 15

Grading: yes pass/fail option, yes fifth course option

Distributions: (D2)

This course is cross-listed and the prefixes carry the following divisional credit:

REL 279(D2) ASIA 279(D2) CAOS 279(D2) ARAB 279(D2)

Not offered current academic year

CAOS 309 (F) Modern Climate (QFR)

Cross-listings: GEOS 309

Secondary Cross-listing

What will happen to the Earth's climate in the next century? What is contributing to sea level rise? Is Arctic sea ice doomed? In this course we will study the components of the climate system (atmosphere, ocean, cryosphere, biosphere and land surface) and the processes through which they interact. Greenhouse gas emission scenarios will form the basis for investigating how these systems might respond to human activity. This course will explore how heat and mass are moved around the atmosphere and ocean to demonstrate how the geographic patterns of climate change arise. We will also focus on climate feedback effects--like the albedo feedback associated with sea ice and glacier loss--and how these processes can accelerate climate change. In labs we will learn MATLAB to use process and full-scale climate models to investigate the behavior of these systems in response to increasing greenhouse gasses in the atmosphere. This course is in the Oceans and Climate group for the Geosciences major.

Requirements/Evaluation: 4 multi-week lab projects and several short quizzes

Prerequisites: Any of GEOS 100, GEOS 103, ENVI 102, GEOS 215, or permission of instructor

Enrollment Limit: 20

Enrollment Preferences: GEOS and ENVI majors

Expected Class Size: 20

Grading: yes pass/fail option, yes fifth course option

Distributions: (D3) (QFR)

This course is cross-listed and the prefixes carry the following divisional credit:

GEOS 309(D3) CAOS 309(D3)

Quantitative/Formal Reasoning Notes: Lab projects consist of a series of numerical climate modeling projects, which require significant quantitative and logical reasoning.

Attributes: ENVI Natural World Electives EVST Environmental Science GEOS Group A Electives - Climate + Oceans

Not offered current academic year

CAOS 311 (F)(S) Marine Ecology

Cross-listings: BIOL 231

Primary Cross-listing

We have explored only a fraction of the ocean, with about 10% of marine species classified and 20% of the ocean mapped. Many discoveries remain to be made, and marine ecology is one technique to uncover new insights. The field of marine ecology, rooted in the theory of evolution, describes the

mechanisms and processes that drive the diversity, abundance, and distribution of marine organisms. The goal is to document natural patterns and make predictions about how species will respond to environmental changes by investigating the relationship between the abiotic environment and biotic interactions. This course will take a deep dive into the unique challenges to life in the ocean. You will compare and contrast different marine ecosystems, such as coral reefs, kelp forests, and the deep sea. You will also practice a marine ecologist's skillset as you design, carry out, and analyze your own research project, which will improve your scientific writing, data analysis, and communication skills. Importantly, you will connect your research and course topics to larger marine conservation issues and broader societal impacts.

Class Format: including coastal and near-shore field trips, 10 days offshore, and a laboratory or field research project

Requirements/Evaluation: two tests, a research project, and a presentation

Prerequisites: BIOL 101 or GEOS/MAST 104, or permission of instructor

Enrollment Limit: 16

Enrollment Preferences: none

Expected Class Size: 12

Grading: yes pass/fail option, yes fifth course option

Unit Notes: This course is only offered through Williams-Mystic Coastal and Ocean Studies Program located in Mystic, CT. satisfies the distribution requirement for the Biology major.

Distributions: (D3)

This course is cross-listed and the prefixes carry the following divisional credit:

BIOL 231(D3) CAOS 311(D3)

Attributes: ENVI Natural World Electives EXPE Experiential Education Courses

Fall 2024

LEC Section: 01 TR 10:30 am - 11:45 am Tim J. Pusack

LAB Section: 02 TR 1:00 pm - 4:30 pm Tim J. Pusack

Spring 2025

LEC Section: 01 TR 10:30 am - 11:45 am Tim J. Pusack

LAB Section: 02 TR 1:00 pm - 4:30 pm Tim J. Pusack

CAOS 323 (S) Law and Politics of the Sea

Cross-listings: PSCI 323

Secondary Cross-listing

Can international law save the seas? That is one current bet. The sea law regime centers on the United Nations Convention on the Law of the Sea (UNCLOS), which gathers into one place what most countries consider to be scattered ancient laws about piracy, transit through other countries' territorial waters, fishing, jurisdiction over ships, and so forth. It also creates ocean zones, with rules for each, and a system for taxing firms that it licensed to exploit minerals on the high seas, and sharing the proceeds with developing countries. It seeks to mitigate conflicts among countries and companies as they energetically compete to exploit the seas. In 2023, UNCLOS launched a follow-on treaty, the Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ), which adds areas in the high seas that all nations commit to protect. This course explores the politics and practices that arise from UNCLOS and BBNJ. We engage with the agreements' history, content, and exclusions, examine the incentives they provides states and criminals, and assess the way that geopolitical and climate collapse create new opportunities and constraints for states, firms, international organizations, and activists. Topics include piracy, naval officers' guidelines, conflict in the South China Sea, bonded labor, refugee quarantine on islands, marine genetic resources, Arctic transit, and ocean pollution. This is a way to understand major deals regarding the oceans; it is also a way to understand what it means to consider an international legal agreement a solution to something.

Requirements/Evaluation: Three 6-page papers, longer final paper, class participation including weekly writing

Prerequisites: Introduction to International Relations, and/or International Law, or permission of instructor

Enrollment Limit: 18

Enrollment Preferences: Political science majors, Marine Studies majors, seniors

Expected Class Size: 12

Grading: no pass/fail option, no fifth course option

Distributions: (D2)

This course is cross-listed and the prefixes carry the following divisional credit:

CAOS 323(D2) PSCI 323(D2)

Attributes: PSCI International Relations Courses

Spring 2025

SEM Section: 01 TR 11:20 am - 12:35 pm Cheryl Shanks

CAOS 327 (F) Coastal Processes and Geomorphology (QFR)

Cross-listings: ENVI 327 / GEOS 327

Secondary Cross-listing

Can people live safely along the coast? Recent events like SuperStorm Sandy and the Tohoku Tsunami have shown us how the ocean can rise up suddenly and wreak havoc on our lives and coastal infrastructure. Only educated geoscientists can evaluate the risks and define informed strategies to prevent future coastal catastrophes. Currently almost half the global population lives within 100 km of the coast, with a large percent of those living in densely populated cities (e.g., New York, New Orleans, Los Angeles, Shanghai, Hong Kong, Cape Town, Sydney, Mumbai). Despite the growing risks and challenges associated with climate change and rising sea levels, the coastal population continues to grow rapidly. To help ensure these growing populations can live safely along the coast requires a detailed understanding of the processes that shape the coastal zone. These processes act across a variety of scales, from deep-time geologic processes that dictate coastal shape and structure, to decadal-scale processes that determine shoreline position and evolution, to weekly and daily processes such as storms and tides. This course will provide an in-depth look at the forces--wind, waves, storms, and people--that shape the coastal zone, as well as the geologic formations--sandy beaches, rocky cliffs, barrier islands, deltas, and coral reefs--that are acted upon and resist these forces. Coastal dynamics are strongly affected by human interventions, such as seawalls, dredged channels, and sand dune removal, as well as by sea level rise and changes in storm frequency and magnitude associated with climate change. Finally, the course will provide students with a perspective on how the U.S. seeks to manage its coastal zone, focusing on sea level rise and coastal development. This class will include a quantitative lab that will use MATLAB software to model and evaluate various coastal processes. Students will gain a basic understanding of MATLAB functionality, and will be asked to independently apply what they have learned to various data sets provided by the instructor.

Class Format: lecture two times a week with a lab one time per week

Requirements/Evaluation: lab reports, quizzes, and an independent research project

Prerequisites: Either GEOS 104 or GEOS 210; or permission of instructor. No prior knowledge is necessary, but this course does build on principles used to explore complex scientific challenges.

Enrollment Limit: 15

Enrollment Preferences: Geosciences majors

Expected Class Size: 15

Grading: yes pass/fail option, yes fifth course option

Unit Notes: This course counts toward the GEOS Group B Electives - Sediments + Life.

Distributions: (D3) (QFR)

This course is cross-listed and the prefixes carry the following divisional credit:

ENVI 327(D3) GEOS 327(D3) CAOS 327(D3)

Quantitative/Formal Reasoning Notes: This course will involve the use of MATLAB software to quantitatively analyze coastal process and geomorphological data.

Attributes: ENVI Natural World Electives GEOS Group B Electives - Sediments + Life

Fall 2024

LEC Section: 01 MWF 8:30 am - 9:45 am Alex A. Apotsos

CAOS 351 (F)(S) Marine Policy (DPE) (WS)

Cross-listings: PSCI 319 / ENVI 351

Primary Cross-listing

Coastal communities are home to nearly 40% of the U.S. population, but occupy only a small percentage of our country's total land area. Intense population density, critical transportation infrastructure, significant economic productivity, and rich cultural and historic value mark our coastal regions as nationally significant. But, coastal and ocean-based climate-induced impacts such as sea level rise, ocean warming and acidification pose extraordinary challenges to our coastal communities, and are not borne equally by all communities. This seminar considers our relationship with our ocean and coastal environments and the foundational role our oceans and coasts play in our Nation's environmental and economic sustainability as well as ocean and coastal climate resiliency. Through the lens of coastal and ocean governance and policy-making, we critically examine conflict of use issues relative to climate change, climate justice, coastal zone management, fisheries, ocean and coastal pollution and marine biodiversity.

Class Format: This class is taught only at Williams-Mystic in Mystic, Connecticut and includes coastal and near-shore interdisciplinary field seminars, and 10 days offshore.

Requirements/Evaluation: Weekly Readings; Class Participation; Small and large group strategy exercises (written and oral); Written Research Project: issues paper and draft research paper; Final Research Project: multiple formats available

Prerequisites: none

Enrollment Limit: 23

Enrollment Preferences: must be enrolled at Williams-Mystic in Mystic, Connecticut

Expected Class Size: 22

Grading: no pass/fail option, no fifth course option

Unit Notes: must be enrolled at Williams-Mystic in Mystic, Connecticut

Distributions: (D2) (DPE) (WS)

This course is cross-listed and the prefixes carry the following divisional credit:

PSCI 319(D2) ENVI 351(D2) CAOS 351(D2)

Writing Skills Notes: Each student will write one 3-5 page research issues paper and one 8-10 page draft research paper as well as a final project with written components equaling 5-8 pages. Each submission receives written feedback from the professor, including research guidance, input on grammar, structure, language, analysis. Students also receive verbal feedback in individual conferences to discuss research paper organization, analysis, structure and grammar as well as final project input.

Difference, Power, and Equity Notes: Coastal and ocean policy issues relating to climate change, coastal zone management, fisheries, ocean pollution and marine biodiversity impact environmental and climate justice. Students examine coastal governance while considering the disproportionate burdens on underrepresented populations in U.S. coastal communities caused by climate change and coastal policies. Students analyze multi-disciplinary evidence and work to strengthen their integrative, analytical, writing, and advocacy skills.

Attributes: ENVI Environmental Policy EXPE Experiential Education Courses POEC Depth

Fall 2024

SEM Section: 01 F 9:00 am - 12:00 pm Derek P. Langhauser

Spring 2025

SEM Section: 01 F 9:00 am - 12:00 pm Catherine Robinson Hall

CAOS 352 (F)(S) American Maritime History (DPE) (WS)

Cross-listings: HIST 352

Primary Cross-listing

This course explores themes in American maritime history from the colonial era to the 21st century. We will consider the dynamic relationship between the sea and American life, and the broad influence that each has had on the other. This relationship led to interactions with the water as a highway for the transportation of not just people and goods, but powerful new forces and ideas. The water creates a unique space for the formation of new communities and identities, while also acting as an important, and often exploited, resource. We will sample from different fields of inquiry including labor, environmental, cultural, and political history to gain a deeper understanding of diverse people's complex interactions with the oceans and seas.

Class Format: Seminars, discussions, and field seminars

Requirements/Evaluation: Participation in class discussions, activities, and presentations, regular papers, and a final independent research project

Prerequisites: None

Enrollment Limit: 27

Enrollment Preferences: If course over-enrolls, preference will be given to sophomores and juniors

Expected Class Size: 22

Grading: no pass/fail option, no fifth course option

Unit Notes: Offered only at Mystic Seaport

Distributions: (D2) (DPE) (WS)

This course is cross-listed and the prefixes carry the following divisional credit:

HIST 352(D2) CAOS 352(D2)

Writing Skills Notes: Students must complete regular writing assignments including a final 10- to 15-page paper. Additionally, students will participate in several in-class writing workshops and peer critiques. Students will receive from the instructor timely comments on their writing skills, with suggestions for improvement.

Difference, Power, and Equity Notes: Maritime activity has long provided opportunities for some while creating tremendous hardships for others. From the slave trade and the encounters between native and European mariners to the power wielded by multi-national shipping conglomerates, this course investigates contests over power, empire, and capitalism as they played out on the maritime stage.

Attributes: AMST Space and Place Electives ENVI Humanities, Arts + Social Science Electives EXPE Experiential Education Courses HIST Group F Electives - U.S. + Canada HIST Group P Electives - Premodern

Fall 2024

SEM Section: 01 MW 9:00 am - 10:15 am Sofia E. Zepeda

Spring 2025

SEM Section: 01 MW 9:00 am - 10:15 am Sofia E. Zepeda

CAOS 361 (F) The Atlantic World: Connections, Crossings, and Confluences (DPE)

Cross-listings: AMST 360 / HIST 361

Secondary Cross-listing

This course considers the Atlantic World as both a real place and a concept: an ocean surrounded and shaped by diverse people and communities, and an imagined space of shared and competing affiliations. Moving from "time out of mind" to the early nineteenth century, it examines ecological, cultural, political, economic, intellectual, and spiritual transits as well as exchanges among Indigenous/Native American, African and African American, Asian and Asian American, and Euro-colonial people. It introduces conceptual dimensions of this Atlantic paradigm and case studies that illuminate its human subtleties, with the goal of examining "early American" histories through transnational and transoceanic lenses. The course takes an interdisciplinary approach to these intertwined histories, and reckons with how the very construction of "history" has, at different turns, affected what is shared, known, valued, and commemorated--or overwritten, denied, or seemingly silenced. Attentive to the structures of power that inflect every part of Atlantic histories, it offers specific ethical frameworks for approaching these topics. Blending methods grounded in oral traditions and histories, place-based knowledge systems, documentary/written archives, songs, archaeology, material culture, and other forms of expression and representation, it invites class members to revisit the nature and meanings of these connected spaces. The course consistently connects historical experiences with the twenty-first century, and how communities today are grappling with the afterlives and ongoing effects of these Atlantic pasts through calls to action for reparations, repatriation and rematriation, Land Back, climate justice, and other forms of accountability. The course also provides an opportunity to engage with original materials pertaining to Atlantic World histories in the Williams College Archives/Special Collections and Art Museum.

Requirements/Evaluation: active participation in class discussion, several short essays based on readings and discussion topics, museum/archives assignment, final essay/project

Prerequisites: none

Enrollment Limit: 25

Enrollment Preferences: If the course over-enrolls, preference is for sophomore, junior, and senior History and American Studies majors

Expected Class Size: 25

Grading: no pass/fail option, no fifth course option

Distributions: (D2) (DPE)

This course is cross-listed and the prefixes carry the following divisional credit:

AMST 360(D2) HIST 361(D2) CAOS 361(D2)

Difference, Power, and Equity Notes: This course examines the formation and articulation of racial, ethnic, cultural, and other forms of difference across the Atlantic World, and ways that people from Indigenous, African/American, and Asian/American communities have engaged with and challenged European colonization. It devotes substantial time to critical methodologies that re-center voices oftentimes treated as "silenced" or "absent" in colonial literatures, and helps students build fluencies in approaching and interpreting them.

Attributes: GBST Borders, Exiles + Diaspora Studies HIST Group F Electives - U.S. + Canada HIST Group G Electives - Global History HIST Group P Electives - Premodern

Fall 2024

SEM Section: 01 TR 9:55 am - 11:10 am Christine DeLucia

CAOS 387 (S) Economics of Climate Change (QFR)

Cross-listings: ECON 387 / ECON 522

Secondary Cross-listing

This course introduces the economic view of climate change, including both theory and empirical evidence. Given the substantial changes implied by the current stock of greenhouse gases (GHGs) in the atmosphere, we will begin by looking at impacts on agriculture, health, income, and migration. We will consider the distribution of climate damages across poor and wealthy people, both within and across countries. Next we will study adaptation, including capital investments and behavioral changes. We will examine the sources of climate change, especially electricity generation and transportation, and think about optimal policies. Throughout the course we will discuss the limits of the economic approach, pointing out normative questions on which economic theory provides little guidance.

Requirements/Evaluation: problem sets, midterm, group presentation, final exam

Prerequisites: ECON 251, familiarity with statistics

Enrollment Limit: 25

Enrollment Preferences: Junior/Senior Economics majors and CDE fellows

Expected Class Size: 25

Grading: no pass/fail option, no fifth course option

Distributions: (D2) (QFR)

This course is cross-listed and the prefixes carry the following divisional credit:

CAOS 387(D2) ECON 387(D2) ECON 522(D2)

Quantitative/Formal Reasoning Notes: The course involves simple calculus-based theory and applied statistics.

Attributes: ENVI Environmental Policy POEC Depth

Not offered current academic year

CAOS 397 (F) Independent Study: Coastal and Ocean Studies

Coastal and Ocean Studies independent study.

Grading: yes pass/fail option, yes fifth course option

Distributions: No divisional credit

Fall 2024

IND Section: 01 TBA Rónadh Cox

CAOS 398 (S) Independent Study: Coastal and Ocean Studies

Coastal and Ocean Studies independent study.

Grading: yes pass/fail option, yes fifth course option

Distributions: No divisional credit

Spring 2025

IND Section: 01 TBA Rónadh Cox

CAOS 410 (S) The Cryosphere

Cross-listings: ENVI 410 / GEOS 410

Secondary Cross-listing

The Earth's climate system is often described in terms of its spheres, including the atmosphere, biosphere, lithosphere, oceans, and the cryosphere. The cryosphere is the naturally occurring ice on Earth in all its many forms: snow, glaciers, ice sheets, sea ice, frozen lakes and rivers, and permafrost (frozen soil). These parts of the climate system may seem remote, but have implications for climate and weather around the world. Melting glaciers and ice sheets have already contributed to sea level rise, and are projected to do so even more in the future. This course will explore the cryosphere, including snow, sea ice, permafrost, and glaciers through lectures, hands-on and data analysis labs, reading journal articles, and a final project. As a 400-level seminar, this capstone course is intended to build on and extend knowledge and skills students have developed during previous courses in the major.

Class Format: Class periods and lab periods will be used interchangeably based on the weather.

Requirements/Evaluation: Evaluation will be based on short papers, labs responses, and a research project

Prerequisites: GEOS 215 or GEOS 255 or GEOS 309 or MAST 311 or permission of instructor

Enrollment Limit: 10

Enrollment Preferences: Senior GEOS majors, then other GEOS majors and senior ENVI majors

Expected Class Size: 10

Grading: yes pass/fail option, yes fifth course option

Unit Notes: As a 400-level seminar, this capstone course is intended to build on and extend knowledge and skills students have developed during previous courses in the major

Materials/Lab Fee: Labs will be outside during the winter: students should be prepared to dress appropriately for the weather.

Distributions: (D3)

This course is cross-listed and the prefixes carry the following divisional credit:

CAOS 410(D3) ENVI 410(D3) GEOS 410(D3)

Attributes: ENVI Natural World Electives GEOS Group A Electives - Climate + Oceans

Spring 2025

LEC Section: 01 WF 8:30 am - 9:45 am Alice C. Bradley

LAB Section: 02 M 8:30 am - 9:45 am Alice C. Bradley

CAOS 414 Life at Extremes: Molecular Mechanisms

All organisms face variability in their environments, and the molecular and cellular responses to stresses induced by environmental change often illuminate otherwise hidden facets of normal physiology. Moreover, many organisms have evolved unique molecular mechanisms, such as novel cellular compounds or macromolecular structural modifications, which contribute to their ability to survive continuous exposure to extreme conditions, such as high temperatures or low pH. This course will examine how chaperonins, proteases, and heat- and cold-shock proteins are regulated in response to changes in the external environment. We will then consider how these and other molecular mechanisms function to stabilize DNA and proteins- and, ultimately, cells and organisms. Other extreme environments, such as hydrothermal vents on the ocean floor, snow fields, hypersaline lakes, the intertidal zone, and acid springs provide further examples of cellular and molecular responses to extreme conditions. Biotechnological applications of these molecular mechanisms in areas such as protein engineering will also be considered. Class discussions will focus upon readings from the primary literature.

Class Format: discussion three hours per week

Requirements/Evaluation: several short papers, participation in class discussions and course notebook

Prerequisites: open to juniors and seniors who are Biology majors; all other students interested in this course should contact the professor; BIOL 202 recommended

Enrollment Limit: 12

Enrollment Preferences: senior Biology majors who have not taken a 400-level course; then junior Biology majors

Expected Class Size: 12

Grading:

Distributions: (D3)

Attributes: BIMO Interdepartmental Electives

Not offered current academic year

CAOS 438 (F) Species Interactions Under Global Change

Cross-listings: BIOL 438

Secondary Cross-listing

Anthropogenic changes to the world's ecosystems often have clear effects on the abundance and distribution of species. These effects, however, do not occur in a vacuum: changes in any given species' presence, abundance, or behavior can cascade into large and surprisingly context-dependent effects on the interactions of other organisms. In this course we will examine competitive, mutualistic, and antagonistic interactions in the Anthropocene from the species pair to community scale. We will explore the ecological and evolutionary mechanisms underlying the outcomes of these interactions, examining patterns including phenological mismatch, species invasions, and anthropogenic land use change. Classes will focus on critical evaluation of evidence from the primary literature, drawing on examples from community ecology, disease dynamics, and global change biology.

Requirements/Evaluation: class participation and three to five papers of length 3-5 pages each

Prerequisites: BIOL 203 or BIOL 204 or BIOL 329 or permission from instructor

Enrollment Limit: 12

Enrollment Preferences: senior Biology majors who have not taken a 400-level course, open to juniors and seniors

Expected Class Size: 12

Grading: no pass/fail option, no fifth course option

Distributions: (D3)

This course is cross-listed and the prefixes carry the following divisional credit:

CAOS 438(D3) BIOL 438(D3)

Fall 2024

SEM Section: 01 Cancelled

CAOS 460 (S) Communicating Climate Change

Cross-listings: ENVI 460

Secondary Cross-listing

Long-term, probabilistic thinking about scary scenarios is hard. When the relevant time frames extend to centuries and millennia, it is really hard. And when the degree of scariness is determined by sciences that few people understand, it is really, really hard. Such is the challenge of climate change communication. No matter what your interests or career paths might be, you will need to be able to communicate effectively about environmental problems, often with people who see them very differently from you. It is difficult to communicate about any problem across social, political, and cultural divides. But environmental problems present special challenges. For one thing, they typically involve complicated, contested science. For another, their effects are often difficult to perceive yet potentially devastating in their consequences, especially for future generations and marginalized people. For yet another, their solutions often seem hopelessly difficult to implement. And for yet another, they are thoroughly entangled with almost every other problem we face, from pandemics to racism to wealth inequality. How do we communicate clearly, persuasively, and responsibly about something so complex? What does climate change really *mean*? This seminar brings together students with interests in the humanities, arts, social sciences and sciences to seek answers to this fundamental question. Drawing on insights from the qualitative social sciences and environmental

humanities, we will develop a theoretical and methodological tool kit that can be applied to concrete, practical problems. Over the course of the semester, each student will pursue a major independent project that allows them to put these tools to use while exploring a topic of personal significance.

Requirements/Evaluation: Several sequenced short writing assignments leading to a 15-20 page final paper.

Prerequisites: Environmental Studies 101 and 102.

Enrollment Limit: 19

Enrollment Preferences: Environmental/Maritime Studies majors and concentrators.

Expected Class Size: 15

Grading: no pass/fail option, yes fifth course option

Distributions: (D2)

This course is cross-listed and the prefixes carry the following divisional credit:

ENVI 460(D2) CAOS 460(D2)

Attributes: CAOS Senior Seminars ENVI Humanities, Arts + Social Science Electives ENVI Senior Seminar EVST Senior Seminar

Spring 2025

SEM Section: 01 W 1:10 pm - 3:50 pm Nicolas C. Howe

CAOS 465 Solutions to the Biodiversity Crisis

The biodiversity crisis is one of the greatest challenges of our century. Faced with climate change, persistent pollution, and habitat fragmentation, species are declining locally and globally. In this upper-level seminar we will integrate knowledge from the natural sciences, social sciences, policy, arts, and the humanities to design and implement biodiversity interventions. Through readings, discussions with experts, and applied projects, we will learn how biodiversity conservation and restoration can be socially just; how spaces can be designed to promote the flourishing of life; and how much local environmental management can alter global trends. We will also envision what the biotic world might look like in 10, 100, and 1000 years and consider who gets to decide which species live and which die, and who *should* decide.

Requirements/Evaluation: One 5-7-page paper; final collaborative project

Prerequisites: Environmental Studies 101 and 102

Enrollment Limit: 19

Enrollment Preferences: Environmental/Maritime Studies majors and concentrators; seniors

Expected Class Size: 12

Grading:

Distributions: (D2)

Attributes: CAOS Senior Seminars ENVI Natural World Electives ENVI Senior Seminar EVST Senior Seminar

Not offered current academic year

CAOS 477 (F) Economics of Environmental Behavior (QFR)

Cross-listings: ENVI 376 / ECON 477

Secondary Cross-listing

A community maintains a fishery; a firm decides whether to get a green certification; you choose to fly home or stay here for spring break: behaviors of people and firms determine our impact on the environment. We'll use economics to model environmental behavior and to assess how policies can help or hurt the environment. Topics we may study include: common pool resources, voluntary conservation, social norms and nudges, discrimination and justice, rationality, firm responses to mandatory and voluntary regulation, voting and public opinion, and international environmental agreements. We'll also build familiarity with the main methodologies of modern economic research: theoretical modeling, empirical analysis of observational data, and experiments.

Class Format: Class sessions will largely consist of presentations and discussions of academic research papers, as well as lab sessions to work on empirical exercises and other interactive activities

Requirements/Evaluation: class participation, regular reading markup, empirical exercises, oral presentation(s), and an original research paper

using an experiment, observational data, or theory

Prerequisites: ECON 251 and (ECON 255 or STAT 346)

Enrollment Limit: 19

Enrollment Preferences: senior Economics majors and junior Economics majors considering a thesis

Expected Class Size: 19

Grading: yes pass/fail option, yes fifth course option

Distributions: (D2) (QFR)

This course is cross-listed and the prefixes carry the following divisional credit:

CAOS 477(D2) ENVI 376(D2) ECON 477(D2)

Quantitative/Formal Reasoning Notes: The research students will consume and produce in the class will be based on math-based theory and/or econometric-based empirical analysis.

Attributes: CAOS Senior Seminars ENVI Humanities, Arts + Social Science Electives POEC Depth POEC Skills

Fall 2024

SEM Section: 01 TR 8:30 am - 9:45 am Sarah A. Jacobson

CAOS 493 (F) Senior Thesis: Coastal and Ocean Studies

Coastal and Ocean Studies senior thesis.

Grading: no pass/fail option, no fifth course option

Distributions: No divisional credit

Fall 2024

HON Section: 01 TBA Rónadh Cox

CAOS 494 (S) Senior Thesis: Coastal and Ocean Studies

Coastal and Ocean Studies senior thesis.

Grading: no pass/fail option, no fifth course option

Distributions: No divisional credit

Spring 2025

HON Section: 01 TBA Rónadh Cox

Winter Study -----

CAOS 31 (W) Sen Thesis: Coastal and Ocean Studies

Coastal and Ocean Studies senior thesis.

Class Format: independent study

Grading: pass/fail only

Winter 2025

HON Section: 01 TBA Rónadh Cox

CAOS 99 (W) Independent Study: Coastal and Ocean Studies

Open to upperclass students. Students interested in doing an independent project (99) during Winter Study must make prior arrangements with a

faculty sponsor. The student and professor then complete the independent study proposal form available online. The deadline is typically in late September. Proposals are reviewed by the pertinent department and the Winter Study Committee. Students will be notified if their proposal is approved prior to the Winter Study registration period.

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Grading: pass/fail only

Winter 2025

IND Section: 01 TBA Rónadh Cox