### ENVIRONMENT AND RESOURCES (ENVRES)

**ENVRES 199. Independent Study.** 1-5 Unit.

- Same as: ENVRES 299

**ENVRES 201. Designing and Evaluating Community Engagement Programs for Social and Environmental Change.** 3 Units.

Non-profit organizations seeking to achieve social and environmental change often run outreach and education programs to engage community members in their cause. Effective application of social science theory and methods may improve the design and evaluation of such community engagement programs. In this class, we will partner with environmental and social justice organizations in the Bay Area to explore two questions: 1) How can recent findings from the social sciences be applied to design more effective community engagement programs? 2) How can we rigorously evaluate outreach and education programs to ensure they are achieving the desired objectives? The course will include an overview of key theories from psychology, sociology, and education, field trips to partnering organizations, and a term-long community-engaged research project focused on designing and/or evaluating a local outreach or educational program that is meant to achieve social and environmental change.

Same as: EARTH/SYS 130

**ENVRES 212. Cities and Sustainability: Current Issues, Policy, and Law.** 2 Units.

Cities are on the front lines of solving many of society's sustainability problems, from advancing green buildings and clean energy, to preparing for the effects of climate change. With a diminishing role of the federal government on environmental policy and regulation, it is up to sub-nationals like states and cities to lead innovation and deployment of clean energy, resilience strategies, water management, and more. This class will explore the evolving role of cities in advancing sustainability from the lens of law, policy, planning, and governance. Some of the topics we will discuss in-depth include climate mitigation, clean energy, green buildings, climate adaptation and resilience, water supply and reuse, land use and transportation, and more. Case studies will focus on U.S. cities with some emphasis on California. Overarching themes across all content areas include legal constraints of city authority, governance, socioeconomic tradeoffs, and the roles of various types of institutions in developing, advancing, and advocating for local policy change. Elements used in grading: Attendance, Class Participation, Written Assignments, Exam. Crosslisted with LAW 2512.

**ENVRES 220. The Social Ocean: Human Dimensions of Costal and Marine Ecosystems.** 1-2 Unit.

This interdisciplinary seminar addresses current coastal and marine topics through a series of readings, discussions, and guest lecturer presentations. Through classic and contemporary scientific literature, news articles, and multimedia sources, students will examine the challenges of coastal and marine policy and management and investigate the human dimensions of potential solutions. The course will begin with global scale topics and conclude with the individual stories of human connection to the ocean. This seminar is open to advanced undergraduate and graduate students.

**ENVRES 221. New Frontiers and Opportunities in Sustainability.** 1 Unit.

Interdisciplinary exploration of how companies, government and non-profit organizations address some of the world’s most significant environmental & resource sustainability challenges. Each week we will explore with an experienced sustainability practitioner new frontiers and opportunities in clean tech, policy, energy, transportation, consumer goods, agriculture, food, and sustainable built environments.

**ENVRES 222. Climate Law and Policy.** 3 Units.

This course offers an interdisciplinary, graduate-level survey of historical and current efforts to regulate emissions of greenhouse gases in the United States. Students will read primary legal documents, including statutes, regulations, and court cases, in order to evaluate the forces and institutions shaping American climate policy. Although the class will focus on the intersection of climate policy and the legal system, no specific background in law is necessary.

**ENVRES 225. E-IPER Current Topics Seminar.** 1 Unit.

For E-IPER Ph.D and Joint M.S. students only. Weekly presentations of E-IPER students’ research and other program-related projects. Occasional guest speakers. Individual or team presentation, active participation, and regular attendance required for credit. May be taken for credit a maximum of two times. Enrollment by department consent only. Contact instructor for permission to enroll.

**ENVRES 226. Energy Law.** 3 Units.

Modern energy systems aim to deliver a supply of reliable, low-cost, and clean energy, in turn, they require massive capital investments in infrastructure projects, some of which have the features of a natural monopoly and therefore require ongoing economic regulation. The U.S. energy system today is subject to a complex regime of state and federal laws. We will examine the historical role of state-level electric utility regulation, tracing its evolution into the various forms of regulated and deregulated energy markets now in use in the U.S. electricity and natural gas sectors. Contemporary energy law increasingly involves a delicate federalist balance where state and federal regulators share overlapping authority in contested policy areas that are subject to major technological and economic change, as changes in the supply and costs of renewable and fossil energy resources alter the U.S. energy sector. Finally, we will interrogate the contested ideals of regulation and competition, which private, non-profit, and governmental stakeholders all deploy in legal and political fora to advance private gain and public goods most recently in a series of transformative proposals to use federal emergency powers to provide financial bailouts to legacy fossil and nuclear power plants. Students who complete the class will gain a historical understanding of how economic regulation of the energy sector has evolved since the early 20th century, a durable conceptual framework for understanding modern energy law and policy debates, and a practical understanding of energy law designed for future practitioners. Non-law students interested in energy issues are highly encouraged to take this course, as energy law literacy is essential to careers in the sector. Elements used in grading: class participation (20%), short written assignments (40%), and a one-day take-home final exam (40%). Crosslisted with LAW 2503.

**ENVRES 230. Field Survey Data Collection & Analysis.** 3 Units.

In this course we will examine a range of issues related to the collection and analysis of survey data. Topics will include initiating a survey, designing an instrument, conducting enumeration, converting data from questionnaires to digital files, data analysis, empirical modeling and presenting results. Technical components will also be highly focused on application and implementation, and while prior training in econometrics would be useful, it will not be a prerequisite. The course will be tailored so that some of the specific topics covered will be based on the needs and interests of the students.

**ENVRES 240. Environmental Decision-Making and Risk Perception.** 1-3 Unit.

This course will explore the barriers to pro-environmental behavior and the heuristics and biases that cloud our ability to respond effectively to environmental problems, using insights from behavioral economics, neuroeconomics, and environmental risk perception. Emphasis on interdisciplinary applications of recent research, and implications for environmental policymaking and persuasive messaging.
ENVRES 245. Psychological Insights for Science Communication. 2-3 Units.
This course integrates lessons learned from psychology, behavioral economics, marketing, and sociology to the practice of science communication, with practical experience working to create and test new messaging for partner environmental organizations. Students learn about innate biases and heuristics that influence the communication of scientific ideas and data and the public’s receptiveness to environmental messaging. Topics covered include information framing, attention and salience, public science literacy and numeracy, simplifying complexity and dealing with uncertainty, cultural and political contexts and social norms, and methods to motivate science engagement, evidence-based decision-making, and behavior change. Students will learn how to design new messaging strategies based on social science research and how to analyze their efficacy using basic statistical analyses in R (no prior programming knowledge is required). The course culminates in a project developing and testing new messaging strategies for real-world environmental organizations.

ENVRES 246. Measuring Success in Environmental Messaging. 1-2 Unit.
How do we understand the impacts of environmental messaging on its target audience, and ensure that it provides compelling and informative content for education, outreach, and behavior change? Once different messaging campaigns have been attempted, how do we evaluate their success? This course teaches students practical social science approaches to assess the efficacy of environmental messaging campaigns by real environmental nonprofit organizations. As a continuation of ENVRES 245, students will work with partner nonprofit organizations to analyze the performance of campaigns designed in the previous quarter, and identify the most salient and motivational aspects of the campaigns that best predicted successful and meaningful outcomes. The course will also focus on how to evaluate outcomes across heterogeneous populations, to better understand how messaging may impact a diverse audience. The statistical computing language R will be used in the course, but prior programming experience is not required. Prerequisite: ENVRES 245: Psychological Insights for Science Communication or consent of instructor required.

ENVRES 250. Environmental Governance. 3 Units.
How do we work together to solve environmental problems? Across the globe, who has a voice, and who ultimately decides how to balance conservation and development? How do we build governance institutions that facilitate both environmental sustainability and social equity? This seminar on environmental governance will focus on the challenges and opportunities for managing common-pool resources, like fisheries, forests, and water. Because managing environmental resources is often about managing people, we will explore the motivations underlying human behavior towards the environment. We will discuss how institutions encode our cultural values and beliefs, and how we can reshape these institutions to achieve more sustainable outcomes. Coursework includes foundational readings and a pragmatic exploration of case studies. Teaching cases address topics in community-based conservation, international protected areas, market-based approaches, coping with environmental risk, and other themes. Interested undergraduate and graduate students from any discipline are welcome.

ENVRES 270. Graduate Practicum in Environment and Resources. 1-5 Unit.
Opportunity for E-IPER students to pursue areas of specialization in an institutional setting such as a laboratory, clinic, research institute, governmental agency, non-governmental organization, or multilateral organization. Meets US CIS requirements for off-campus employment with endorsement from designated school official.

ENVRES 276. Water Resources: Culture and Context. 3-5 Units.
Students in this discussion-based seminar will examine both the social and environmental challenges of managing California’s freshwater resources. The multidisciplinary team of instructors will introduce a range of textual sources - engineering, cartographic, art historical, and ecological, to name a few - and the class will engage directly with Cantor’s “Art of Water” exhibition as well as local feats of water infrastructure. Students will gain historically-grounded insights through tailored weekly assignments and develop creative solutions for freshwater security as the final project.
Same as: AMSTUD 276

ENVRES 280. Introduction to Environment and Resources. 2 Units.
Required core course restricted to E-IPER Joint M.S. students. This course functions as a gateway to fundamental concepts in environment, energy and sustainability. Topics include climate change, ecosystem services, life cycle assessment, energy systems, food systems, and others. Students engage with affiliated faculty, and begin to develop ways to integrate science and technology with business, law and other professional skills to solve environment and resource problems.

ENVRES 290. Capstone Project Seminar in Environment and Resources. 1-3 Unit.
Required for and limited to E-IPER Joint M.S. students. Propose, conduct and publicly present final individual or team projects demonstrating the integration of professional (M.B.A., J.D., or M.D.) and M.S. in Environment and Resources degrees. Presentation and submission of final product required. 3 total units required; can all be taken during one quarter or divided over two sequential quarters.

ENVRES 299. Independent study. 1-5 Unit.
Same as: ENVRES 199

ENVRES 300. Introduction to Resource, Energy and Environmental Economics. 3 Units.
Required core course restricted to first year E-IPER Ph.D. students. Examination of environmental, energy and natural resource management problems through the lens of economics, with an emphasis on hands-on practical problem-solving. Topics include market failure, cost-benefit analysis, finance, risk & uncertainty, non-market valuation, regulation, green accounting, rent, renewable resources, exhaustible resources, including energy, and biodiversity. Prerequisite: proficiency in multivariate calculus. Knowledge of basic microeconomics helpful but not essential.

ENVRES 315. Environmental Research Design Seminar. 1 Unit.
Required core course restricted to first year E-IPER Ph.D. students. Series of faculty presentations and student-led discussions on interdisciplinary research design as exemplars of the research design theories discussed in ENVRES 320. Designing Environmental Research. Topics parallel the ENVRES 320 syllabus. Corequisite: ENVRES 320.

ENVRES 320. Designing Environmental Research. 3-4 Units.
Required core course restricted to first year E-IPER Ph.D. students. Research design options for causal inference in environmentally related research. Major philosophies of knowledge and how they relate to research objectives and design choices. Identification of critical elements within a broad range of research designs. Evaluation of the types of research questions for which different designs are suited, emphasizing fit between objectives, design, methods, and argument. Development of individual research design proposals, including description and justification understandable to a non-specialist. Enrollment by permission number only. Contact instructor for enrollment in course.
ENVRES 330. Research Approaches for Environmental Problem Solving. 3 Units.
Required core course restricted to first year E-IPER Ph.D. students. How to develop and implement interdisciplinary research in environment and resources. Assignments include development of research questions, a preliminary literature review, and a summer funding proposal. Course is structured on peer critique and student presentations of work in progress. Corequisite: ENVRES 398 with a faculty member chosen to explore a possible dissertation topic.

ENVRES 340. E-IPER PhD Writing Seminar. 1-2 Unit.
Required core course restricted to second-year E-IPER PhD students. Actively pursue one or more writing goals relevant to this stage in their graduate studies in a structured setting. Set specific writing goals, create and follow a plan for reaching these goals, and receive substantive feedback on their written products from their peers. Examples of writing products include, but are not limited to, the student's dissertation proposal, E-IPER Fields of Inquiry essay, a literature review, or a grant or fellowship application. By the end of the course, students are expected to have completed or have made substantial progress toward their writing goal.

ENVRES 380. Innovating Large Scale Sustainable Transformations. 3-4 Units.
This class establishes innovation of systemic transformations as a crucial leadership modality. It gives students the mindsets, theoretical framework, and hands-on experience in shaping innovative interventions that bring about scaled and profound transformations in the face of complex multi-factorial challenges. Students are immersed in the Deep Change Methodology, which combines systems thinking, strategy, design thinking, behavioral sciences, resilience theory, diffusion theory, decision theory, and a theoretical framework around scaled multistakeholder interventions. Tools and theories introduced in class will be used to structure large-scale transformations that simultaneously create sustainability and resilience on environmental, societal, and economic fronts. This project-based team-based class challenges students to find solutions for complex real world challenges. Consent of instructor required. Class meets Fridays 9:30am-4:20pm, weeks 2-9. Lunch is provided. Final presentations on Friday of week 9, 3-7:30pm.
Same as: SUST 230

ENVRES 391. Curricular Practical Training. 1 Unit.
Educational opportunities in research and development labs in industry. Qualified students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and complete a research report outlining their work activity, problems investigated, results, and follow-on projects they expect to perform. Course may be repeated for credit.

ENVRES 398. Directed Reading in Environment and Resources. 1-10 Unit.
Under supervision of an E-IPER affiliated faculty member on a subject of mutual interest. Joint M.S. students must submit an Independent Study Agreement for approval. May be repeat for credit.

ENVRES 399. Directed Research in Environment and Resources. 1-15 Unit.
For advanced graduate students. Under supervision of an E-IPER affiliated faculty member. Joint M.S. students must submit an Independent Study Agreement for approval.

ENVRES 801. TGR Project. 0 Units.

ENVRES 802. TGR Dissertation. 0 Units.