

## **Geography and Environmental Planning (GEP)**

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### **GEP 200 GLOBAL ENVIRONMENTAL ISSUES (3)**

Lecture/discussion, 3 hours. An introduction to environmental studies and planning, including: humans in relation to the global ecosystem; an overview of problems of energy use, pollution, resource depletion, population growth, food supply, urbanization, climate change, and biodiversity; and the search for solutions and future prospects. Satisfies GE Area D5 (Contemporary International Perspectives).

### **GEP 201 GLOBAL ENVIRONMENTAL SYSTEMS (4)**

This course presents a broad survey of how the earth works. It focuses on the processes within, and the relationships between, the four global sub-systems: the atmosphere, biosphere, hydrosphere, and lithosphere. The course examines how physical, chemical, and biological functions create local, regional, and global climate and landscape patterns. It also explores the links between human activities and changes in climate, vegetation patterns, and landform processes. The course includes weekly two-hour lab sessions in which students participate in field-based data collection exercises and conduct scientific analyses. Satisfies GE Area B1 (Physical Science).

### **GEP 202 QUANTITATIVE METHODS (4)**

Lectures and workshop designed to enhance students' confidence in analytical problem solving. Essential techniques emphasizing environmental applications: translating knowledge into abstract and mathematical models, numerical estimates, basic geometry and trigonometry, dimensional analysis, unit conversions, interpreting statistical data, and graphic display of information. Conceptual introduction to calculus, differential equations, and complex numbers. Prerequisites: Completion or concurrent enrollment in GE Area B4 (Math Concepts).

### **GEP 203 HUMAN GEOGRAPHY (3)**

The course introduces students to a spatial perspective of cultural, economic, political, demographic, and environmental processes. We review the deep historical origins of many social processes and examine how they continue to influence our contemporary experience. We also study how these processes change as they move across geographic space and encounter other cultures and places. Satisfies GE Area D2 (World History and Civilization).

### **GEP 205 WORLD REGIONAL GEOGRAPHY (3)**

This course explores 4-5 world regions from a holistic perspective, examining their economic, political, demographic, cultural, and environmental landscapes with considerable historic depth. The course also considers how each region fits within a larger global political and economic system, and how their roles have changed, particularly with globalization. Satisfies GE Area D5 (Contemporary International Perspectives).

### **GEP 206 SOCIETY, ENVIRONMENT, AND SUSTAINABLE DEVELOPMENT (3)**

The course brings an historical perspective to critical analyses of changing relationships between civilizations and their environments. Following an introduction to Earth's environmental systems, course critiques several modes of understanding specific environmental problems caused by development. Course concludes with extended study of one globally important human-environment-development nexus. Meets GE Area D2 (World History & Civilization).

### **GEP 215 GEP FORUM (1)**

Regular weekly departmental lecture series. Outside professional speakers and GEP alumni and faculty report on topics and opportunities relating to careers in Geography, Environment, and Planning. Cr/NC only.

### **GEP 305 WORLD REGIONS IN GLOBAL CONTEXT (4)**

Selected regions of the world form the basis of study. Economic development, political problems, man-land relationships, and global issues are covered. The course uses geographical methodologies and concepts and is interdisciplinary in its observations of world regions. Satisfies GE Area D5 (Contemporary International Perspectives).

### **GEP 310 PROFESSIONAL PREPARATION (1-2)**

This seminar covers topics essential for professional preparation in the fields of geography and environmental studies. Topics include discussions with guest speakers on career options in governmental, private, and non-profit settings; writing highly effective resumes, CVs, and cover letters; and techniques for successful interviewing. The course will also cover preparation for future training in professional and academic fields. Cr/NC only. Prerequisites: GEP majors, juniors or seniors.

### **GEP 312 PROFESSIONAL CONFERENCES (1-2)**

Students learn about professional research, presentation, and discourse, and attend research presentations at a professional conference. Conference and travel may include professionally led field trips. The course requires an additional fee. Course may be repeated for credit. Up to 2 units of GEP 312 in total may be counted towards the major.

### **GEP 313 FIELD EXPERIENCE (1-2)**

Field experience is provided in a variety of topical areas. The course titles and contents will vary and may be repeated for credit. Please see the current Schedule of Classes for the particular topic offered. A fee will be charged for this course. Up to 2 units of GEP 313 in total may be counted toward the major.

### **GEP 314 FIELD EXPERIENCE ABROAD (2-3)**

Field Experience outside the United States (2-3). Cultural and physical studies of people and places through travel, observation and interaction, and oral and written analysis. Destinations include Central and south American countries. Course contents and locations will vary; may be repeated for credit. Check with instructor regarding destination and cost. Offered during Intersession or Summer Session. Prerequisite: consent of the instructor.

### **GEP 317 INTERNSHIP (1-4)**

Students in the internship program will be given the opportunity to gain practical experience in their area of study by working in a variety of county and city agencies and organizations in the Sonoma State University service area. Credit is given for three hours per unit work per week as arranged with the internship coordinator. Must have junior- or senior-level standing and a minimum GPA of 2.75, or permission from the Department Chair. May be repeated once for credit.

### **GEP 320 GEOPOLITICS (4)**

In this course we dig deep into the field of geopolitics, the struggle for control over territory, transportation corridors, and natural resources. We analyze the origin of the discipline, its historical development, and key contemporary issues, including the Iraq War, the U.S. missile defense shield and the expansion of NATO, the promotion of democracy as a security strategy, Iranian nuclear ambitions, and Chinese military expansion. We will also examine the upsurge of nationalism since the end of the Cold War, and examine ethno-national rebellion from multiple perspectives, including the failure of nation-building, the failure of economic development, and competition over scarce natural resources.

### **GEP 322 GLOBALIZATION AND ENVIRONMENTS (4)**

This course critically analyzes the practices and ideas that underlie economic development and the resultant degradation of environments. The class attends to ways that specific people and places have either resisted environmental impoverishment, or alternatively worked together to create different, environmentally and socially sustainable paths to empowerment and well-being.

### **GEP 323 RESOURCE MANAGEMENT & DEVELOPMENT IN GLOBAL PERSPECTIVE (4)**

This class explores the use and management of natural resources. Each year, it focuses on a different set of renewable and non-renewable resources, such as water, oil, diamonds, rangeland, and others. It addresses topics such as distribution, scarcity, substitution, access and use-rights, resource cartels, regulation, and sustainability. It also looks at how these issues are changing under globalization and the rise of transnational corporations.

**GEP 324 CLIMATE CHANGE AND SOCIETY (4)**

This course briefly reviews climate change mechanisms and models. It then turns to its main topics: attempts and failures to mitigate greenhouse gas production, specific predicted challenges, and current and future attempts to adapt to the environmental and social impacts related to changing climates. The course complements GEP 356.

**GEP 325 GLOBAL FOOD SYSTEMS: SCARCITY AND SUSTAINABILITY (3-4)**

This course explores the development of agriculture from its origins to its modern forms. It discusses the historical development and current structure of five agricultural systems: small and large corporate farms in the development of the world, as well as traditional peasant production systems, plantations, and green revolution forms in the developing world. It then considers issues such as world hunger, food aid, global commodity trade, and the affect of biotechnology in both the developed and developing world.

**GEP 327 LATIN AMERICA AND THE CARIBBEAN (4)**

From an environmental history perspective, the class begins with an investigation of pre-Columbian and post-contact social ecologies. This leads to analysis of more contemporary processes such as rural modernization, the rapid growth of cities and migration, the role of identity and women, and the dynamics of free-trade globalization and international relations.

**GEP 328 AFRICA SOUTH OF THE SAHARA (4)**

Students explore various historical and contemporary processes that have created Africa's diverse and complex geography. The course begins with a historical survey of the continent, starting with its great civilizations and continuing through its experiences through colonialism, independence, the cold war, and globalization. This section of the class examines how these major events have played out throughout the different regions of Africa, south of the Sahara. The class then turns directly to thematic issues that are central to a human-geographic perspective of the continent: population, rural/urban dynamics, education and health issues, and human-environment interactions including agricultural systems and conservation issues. Finally, with a deeper understanding of the region, the course addresses present-day political hot spots of post-cold war Africa, and the critical development problems plaguing the continent.

**GEP 330 ENVIRONMENTAL HISTORY (4)**

Environmental history offers an earth's-eye view of the past, by addressing the many ways in which humans have interacted with the natural environment over time. How has the environment shaped the course of human history, and how have human actions and attitudes shaped the environment? And how does studying past environments help us understand our present-day challenges? All too often, historians study the human past without considering nature; similarly, all too often, scientists study nature without considering human history. We will explore the value of integrating these different perspectives, and argue that a historical perspective is absolutely crucial if one hopes to understand contemporary environmental issues. Prerequisite: Completion of GE Area A (Communication and Critical Thinking).

**GEP 331 RESTORATION AND SOCIETY (4)**

This capstone course focuses on the ideas and theories behind environmental restoration work and asks some critical questions about the field: where did the idea of restoration come from? What are the goals of environmental restorations, and how do you know if a project is meeting those goals? What do we mean by the terms "wilderness", "native", "diversity", and so forth? Do environmental mitigation projects really work? We will also look at several specific case studies through the semester. Prerequisite: Seniors and Graduate students only, consent of instructor.

**GEP 332 ENVIRONMENTAL LITERATURE (3)**

A survey of great American environmental books, including H. D. Thoreau's *Walden*, John Muir's *Mountains of California*, and works by other environmental authors. The course considers the natural, political, cultural, and historical environment of the writers. Prerequisites: Junior- or senior-level standing.

**GEP 335 U.S. ENVIRONMENTAL POLICY (4)**

This class starts with the idea that institutions of government are not a fixed inheritance but choices that are constantly being revised. The goal of the course is to sort out that assertion while providing a basic introduction to both American political institutions and major environmental issues. We will look at choices shaping the structure of governance and tools of environmental policy. Where are we heading in terms of democratic decision-making, responsibility, and accountability? How does the realm of international policy dovetail with national-level governance? Prerequisite: Completion of GE Area D4.

**GEP 336 U.S. ENVIRONMENTAL LAW (3)**

Review of environmental law and regulation in the United States generally and California in particular. Overview of federal and California legal systems with emphasis on their role in environmental protection. Evolution of environmental law in the United States, including property rights and environmental justice. Prerequisite: junior- or senior-level standing.

**GEP 337 LANDSCAPE HISTORY OF THE AMERICAN WEST (3)**

Use of and interactions with natural resources have transformed the American West over time, and greatly affected the western environment as we know it today. This seminar takes a historical look at the settlement, development, and management of the western landscape, both in terms of natural resources (timber, water, grazing, parks etc.) but also in terms of cultural settlement and use - and considers landscape as a tool for understanding the cultural/social/political history of a place. Students can expect to do some serious reading, writing, and thinking about how and why the West has become such a distinctive natural and cultural landscape. Open to juniors, seniors, and graduate students only or consent of instructor. Prerequisite: juniors, seniors, or graduate students. Cross-listed as HIST 467.

**GEP 339 SPECIAL TOPICS IN SOCIETY, ENVIRONMENT, & DEVELOPMENT (2-4)**

Intensive study of selected topics related to Society, Environment, and Development. Topics vary from semester to semester. May be repeated for credit with consent of instructor.

**GEP 340 APPLIED ECOLOGY (3-4)**

This course explores major concepts of ecology and examines current environmental issues in light of these concepts. Topics include: relationship between organisms and the physical environment, community-level ecological processes, the structure and function of ecosystems and their distribution on the planet, evolutionary processes, and population ecology. Environmental issues include loss of biodiversity, global climate change, invasive species, and others. Development of speaking and writing skills is a significant element of the course. Field trip required. Prerequisite: completion of GE Area B2 or consent of instructor.

**GEP 341 CONSERVATION BIOLOGY (3-4)**

Interdisciplinary investigation into biological, management, economic, and ethical issues associated with the current extinction of species. Course will cover principles and applications of ecology, population biology and genetics, biogeography, and social sciences for protection and management of biodiversity in the face of current widespread alteration of the environment. At least one field trip required. Prerequisites: GEP 340 or BIOL 122 or BIOL 131 (can be taken concurrently), junior- or senior-level standing only.

**GEP 343 BIOGEOGRAPHY (4)**

Biogeography is the study of plant and animals distributions at local to global spatial scales, and seeks to understand the physical, biological and human processes that determine these patterns through time. This is a highly integrative field of inquiry, pulling on concepts, theories and data from general ecology, evolutionary biology, geology, physical and human geography, and geospatial science. With its perspective on broad spatial and temporal scales, Biogeography is particularly relevant for designing viable long-term strategies for nature conservation in the face of modern human-induced changes, such as global warming and habitat conversion. This course uses lectures, reading assignments and an individual student project to explore past and present biota at regional to global scales, and a field trip to understand our local northern California ecosystems. Prerequisite: GEP 201, or consent of instructor.

**GEP 350 GEOMORPHOLOGY (4)**

Lecture, 3 hours; laboratory, 3 hours. Explores the relationships between surface processes such as weathering, mass movements, running water, wind, waves, and glacial ice, and the landforms these processes create. The course looks at geomorphic systems and the role of tectonics and climate in changing the balance of these systems. Actual research projects are presented to demonstrate geomorphic approaches to environmental questions. Students are exposed to research methods in the field and lab. Field trips and field reports, use of maps, and hands-on labs are included. A fee will be charged for this course. Prerequisites: GEP 201, GEOL 102, or consent of instructor.

**GEP 351 NATURAL HAZARDS (3-4)**

This course examines natural hazards in relation to human populations and activities around the world. It focuses on disasters generated by weather, climate, and geomorphic processes (such as hurricanes, landslides, tsunamis, and earthquakes) as well as global climate change. It considers risk assessment, hazard perception, population change, and impact on the built environment. Prerequisite: GEP 201 or consent of instructor.

**GEP 352 SOIL SCIENCE (3-4)**

An introduction to soil science emphasizing applications to agronomy, archaeology, botany, ecology, engineering, geography, geology, land use planning, hazardous materials management, and water quality. Technical exercises emphasize low-cost scientific analytical equipment.

**GEP 354 WATERSHED HYDROLOGY AND MANAGEMENT (4)**

This course focuses on the flow of water between Earth's atmosphere, surface and the root zone of the soil, with a focus on the watershed unit. The hydrologic processes affecting surface and groundwater resources in a watershed, including precipitation, evapotranspiration, infiltration, and runoff will be examined in lectures and labs. Prerequisite: GEP 201, or consent of instructor.

**GEP 355 WEATHER AND CLIMATE (4)**

An exploration of the atmosphere, how it differs from place to place and time to time. The role of radiation, temperature, humidity, evaporation, cloudiness, precipitation, and surface factors (topography, exposure and altitude) in differentiating world climates. Climate's influence on man physically and culturally, in history and prehistory. Climate change, drought and flood, and solar radiation are among the topics investigated in detail. Prerequisite: GEP 201 or consent of instructor.

**GEP 356 GLOBAL CLIMATE CHANGE: PAST, PRESENT, AND FUTURE (4)**

An advanced course focusing on evidence of past climate change and predicted future change. Research methods used to reconstruct past climates are explored. Climate dynamics and the response of the environment will be examined. Prerequisites: GEP 201 and junior status.

**GEP 359 SPECIAL TOPICS IN ENVIRONMENTAL SYSTEMS (1-4)**

Intensive study of selected topics related to Environmental Systems. Topics vary from semester to semester. May be repeated for credit with consent of instructor.

**GEP 360 INTRODUCTION TO PLANNING (3)**

An overview of land use planning and associated concerns, such as environmental protection, transportation, open space preservation, housing, economic development, urban design, and public finance. Consideration of the evolving forms and functions of cities, towns, and rural areas and society's attitudes toward development, environmental concerns, and the appropriate role of government in regulating land use. Course addresses general plans, zoning, growth management, environmental impact assessment, and the local political process relating to planning. Current trends in planning and sustainable community development.

**GEP 361 PLANNING THEORY AND METHODOLOGY (3-4)**

Exploration of evolving planning thought and processes as a basis for understanding planning practice. Comprehensive planning, incremental, and communicative action models. Planning and local politics. The values and ethics of the professional planner. Mediating environmental and land use disputes. Basic analytical, methodological, and communication skills utilized in urban, environmental, and business planning. Prerequisites: GEP 360 or can be taken concurrently, junior- or senior-level standing.

**GEP 362 ENVIRONMENTAL IMPACT ASSESSMENT (2-3)**

The theory and practice of environmental impact assessment ("EIA"). The role of EIA and impact mitigation in policy development and implementation. The practice of preparing environmental review documents as mandated by state and federal law. The relationship between environmental review and comprehensive planning. Prerequisite: Junior- or senior-level standing.

**GEP 363 LAND USE LAW (3)**

Overview of the law governing land use in California. Fundamentals of the legal system and legal analysis. Substantive law regarding planning and zoning, subdivision, development conditions, growth management, land use initiatives, vested rights, and design review. Constitutional protection of property rights. Prerequisites: Juniors, seniors and grad students only; GEP 360 recommended.

**GEP 364 ENVIRONMENTAL PLANNING (3-4)**

This course focuses on the relationship between land use planning and environmental and natural resources concerns, using property and landscape as our primary lenses. We will consider how ideas regarding resource management, open space, biodiversity, "sustainability", etc., are reflected in land use planning processes and practices. The course will examine broad planning and regulatory tools, such as EISs, regional planning, and resource management planning, and more specific applications such as Habitat Conservation Plans and open space planning. Prerequisite: GEP 335 recommended.

**GEP 365 HEALTHY COMMUNITIES PLANNING (3-4)**

Introduces students to the field of planning for healthy communities, including the relationship of the built environment and land conservation to healthy eating, bicycling and other forms of active transportation, walkability and active living, mental health, crime and violence, access to health care, health equity, etc. Students will evaluate the rapidly evolving thinking on these topics. Prerequisites: juniors, seniors, graduate students; Introduction to Planning (GEP 360) recommended.

**GEP 366 PLANNING FOR SUSTAINABLE COMMUNITIES (3)**

Sustainability as a concept in environmental and land use planning. Definitions and models of sustainability. Evaluation of sustainable development on global, national, regional, and local levels. Practical experience with city and county planning for sustainability. Prerequisites: Juniors and seniors only; GEP 360 recommended.

**GEP 367 TRANSPORTATION PLANNING (3)**

Theory, methods, and tools related to the systematic analysis of city, regional, and rural transportation problems. The focus is on fundamental land use and transportation interrelationships. Transportation as an integrated system composed of automobiles, public transit, bicycles, and pedestrian travel modes. Transportation impact assessment. Congestion management, energy conservation, sustainability, and environmental impact considerations. Prerequisite: GEP 360 recommended.

**GEP 368 URBAN DESIGN I: THE URBAN FORM (3)**

An exploration of the physical and visual form of urban communities. The appearance and aesthetic qualities of public open spaces, streets, buildings, neighborhoods, city gateways, signs, and other elements of the urban scene. Meaning of "sense of place." The effects of public policy and regulations on urban form. The scale, pattern, and image of urban form elements. Planning for new communities, historic preservation, urban plazas, and public art. Prerequisite: Junior- or senior-level standing; Introduction to Planning (GEP 360) is recommended.

**GEP 369 URBAN DESIGN II: PLACEMAKING (3)**

Course focus is on the process of designing urban places where public life and a sense of community can thrive. Many critics of American cities have lamented the fact that these urban areas have lost their uniqueness; the urban landscape has come to be visually characterized by a dispiriting "sameness". Considered most offensive are standardized development of chain and "big box" stores with their corporate "logo" signs, and "cookie cutter" residential subdivisions. The course explores efforts of communities to retain their uniqueness and enhance civic pride, including the creation of vibrant public spaces, lively pedestrian environments, and comfortable and safe streets and neighborhoods. The meaning, purposes, and techniques of "contextual design" are explored, especially those designed to protect local historical heritage and regional distinctiveness. Prerequisites: sophomores, juniors, seniors, or graduate students; GEP 360 recommended.

**GEP 370 GLOBALIZATION AND THE CITY (4)**

This course examines the evolution of cities as local and global political, economic and social centers. It explore the forces that drove urban growth and change in the 20th century, with a focus on how these forces shape contemporary issues such as inequality, cultural change, and segregation.

**GEP 371 SOCIAL GEOGRAPHY (3)**

Studies aspects of demography, migration, and the spatial dimension of social organization. Included in the course are the spatial perspectives of social well-being, poverty, crime, and ethnicity. The spatial structure of human settlement, as well as political, religious, and social values will be discussed. Satisfies upper-division GE Area E (Integrated Person).

**GEP 373 ENERGY, TECHNOLOGY, AND SOCIETY (4)**

A lecture/discussion course designed to assist students in understanding energy as a fundamental measure of organization, structure, and transformation in society. Principal topics include: energy history; thermodynamics; energy resources and conversion technologies; global issues and trends; environmental impacts; energy economics, institutions, and politics. Elementary quantitative analysis. Prerequisites: Junior- or senior-level standing, and completion of GE Area B4 (Mathematical Concepts) or prior or concurrent enrollment in GEP 202.

**GEP 379 SPECIAL TOPICS IN SUSTAINABLE COMMUNITIES (2-4)**

Intensive study of selected topics related to Sustainable Communities. Topics vary from semester to semester. May be repeated for credit with consent of instructor.

**GEP 380 ENVIRONMENTAL REMOTE SENSING (4)**

Environmental remote sensing uses imagery from satellite and airborne sensors to map properties of the Earth over broad spatial scales. This course develops an understanding of physical principles behind remote sensing, explores a range of sensors, spatial scales, and locations, and uses image processing techniques for extracting useful environmental information.

**GEP 385 CARTOGRAPHIC VISUALIZATION (3-4)**

Lecture, 2 hours; laboratory, 3 hours. Map and graphic methods in geography: history, design, theory, and construction. Topics include selection of map projections, use of scales, generalization, data input and processing, color, visualization of spatial data, and map production. Emphasis is placed on effective communication through graphic design. Covers the increasing role of geographic information systems (GIS) in cartography. Also examines the collection of geographic data, such as with global positioning systems (GPS). Exercises guide students through increasingly complex methods of data collection and cartographic construction. Laboratory fee may be charged; see current Schedule of Classes.

**GEP 387 INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS (4)**

Geographic information system (GIS) technologies provide researchers and policy-makers with a powerful analytical framework for making decisions and predictions. As with any technology, the appropriate use of GIS depends greatly on the knowledge and skills of the user. This course addresses the scientific and technical aspects of working with geographical data, so that GIS users understand the general principles, opportunities, and pitfalls of recording, collecting, storing, retrieving, analyzing, and presenting spatial information. Both fundamental concepts and "hands on" experience with state-of-the-art software are incorporated through readings, lecture discussion, and laboratory assignments. The first half of the course focuses on the "nuts and bolts" of how a GIS works, while the second half concentrates on methods for spatial analysis and modeling. Prerequisite: Course requires a basic competency with Microsoft operating system and Office applications.

**GEP 388 ENVIRONMENTAL GEOGRAPHIC INFORMATION SYSTEMS (3-4)**

Environmental issues typically involve a range of physical, ecological and socio-economic factors with complex interactions that span multiple spatial and temporal scales. Computer-based Geographic Information Systems (GIS) are particularly well-suited for describing, analyzing and modeling environmental problems and datasets, and the technology is widely used for local- to global-scale research, impact assessment, conservation planning and natural resource management. This course investigates a range of environmental problems through the unique perspective afforded by geospatial data analysis within a GIS. Lectures introduce the ecological, scientific and societal issues associated with major environmental issues of our time, such as land-use change, biodiversity loss, and global carbon emissions. These issues are then quantitatively analyzed with real-world spatial datasets using GIS-based methods and tools in coordinated laboratory exercises. In the process, students extend and strengthen GIS skills and concepts acquired through GEP 387. Prerequisites: GEP 387, basic college-level math, statistics helpful.

**GEP 389 ADVANCED GEOGRAPHIC INFORMATION SYSTEMS (3)**

This course provides greater depth in Geographic Information Systems (GIS). Through lab exercises, students build GIS databases, perform geospatial analyses, and create maps. Students conduct an independent research project on a topic of their choice, gather the appropriate spatial data, conduct GIS analyses, and present their results. Prerequisite: GEP 387.

**GEP 390 ENVIRONMENTAL DATA ANALYSIS (4)**

This course will introduce students to environmental data (Atmospheric, Oceanic and Earth's surface). Students will learn how to access, pre-process and analyze data using different statistical methods and geographic information systems (GIS). The course will also examine research questions that can be answered using these types of data and analyses. Lecture/Lab. Prerequisite: Course requires a basic competency with Microsoft operating system and Office applications.

**GEP 411 SEMINAR IN PLANNING PROFESSIONAL PRACTICE (1-2)**

Discussion of situations and challenges new planners are likely to encounter early in their professional careers. Seminars include discussions with professional planners on such topics as working with the public, elected officials, and other professionals; maintaining relations with the press; ethical dilemmas; and other matters of current concern. Discussion of students' internship experiences. Must be taken within two semesters of graduation. Cr/NC only. Prerequisites: GEP majors, senior-level standing.

**GEP 416 ENERGY FORUM (1-2)**

Speakers, including community professionals, program alumni and University faculty, cover a wide variety of energy issues with formal presentations followed by discussion period. May be repeated for credit. Prerequisites: Junior- or senior-level standing.

**GEP 418 LAB ASSISTANT IN GEP (2)**

Open only to advanced students who have been invited by the faculty member to serve as a Lab Assistant for GEP 201 Global Environmental Systems. Intended to give students experience in assisting the instructor in the laboratory. Prerequisite: consent of instructor. May be repeated once for credit.

**GEP 419 TEACHING ASSISTANT IN GEP (1-4)**

Open only to advanced students. Intended to give students experience in assisting the instructor in a Geography, Environment, and Planning (GEP) course by doing research and tutoring students in the class. Prerequisite: Consent of instructor. This may be repeated for credit.

**GEP 440 FIELD METHODS (2)**

This course provides hands-on experience with field sampling techniques commonly used in biophysical data collection and spatial inquiry. Course topics include sample design, field measurements, statistical data analysis, report writing, and the use of field equipment. Field work will be conducted mainly in the Fairfield Osborn Preserve and surrounding area. Data collected from vegetation sampling, soil descriptions, microclimate measurements, and geomorphologic observations will be used to interpret the natural and anthropogenic landscape. Throughout the course, students will work with Global Positioning System (GPS) units to accurately locate their field samples on the Earth, allowing for subsequent spatial analysis. Laboratory fee may be charged; see current Schedule of Classes. Prerequisite: GEP 201, or consent of instructor.

**GEP 441 LAB METHODS (2)**

This course provides hands-on experience with laboratory analysis techniques commonly used in physical geography. Topics include stratigraphic and laboratory analyses, report writing, and data presentation. Data collected from soil and sediment profiles and tree rings will be used to interpret environmental conditions. Students will follow laboratory methods, protocols, and use analytical equipment. Laboratory fee may be charged; see current Schedule of Classes. Prerequisites: GEP 201 or consent of instructor.

**GEP 442 CONSERVATION RESEARCH METHODS (3)**

This research seminar emphasizes a current topic of applied and theoretical interest in the field of conservation biology. Students investigate the topic through a field research project, along with readings and discussions. Students contribute to all phases of the research, from generating hypotheses and collecting data in the field, to analyzing the data and writing a scientific paper based on the results. Each class focuses on a different topic and related set of field methods.

**GEP 443 INTRODUCTION TO AGROECOLOGY (2)**

This course provides a broad introduction to the design and management of agroecosystems. Students explore the theory and practice of agroecology and how its principles address social and environmental problems in the global food system. Students are introduced to agroecological production methods, including soil management, water systems, biodiversity development, integrated pest management, flower production and urban gardening methods, and applications of these methods in a student garden. Approximately half of this course is classroom-based instruction while the other half is hands-on garden-based work.

**GEP 444 NATIVE PLANTS IN RESTORATION (2)**

This field and lab course focuses on the applied aspects of plant propagation and the appropriate placement of native plants in landscape and restoration settings in California. Topics include native plants and plant communities, techniques for selecting, collecting and replicating plants for production, and restoration site preparation and maintenance. Additional topics may include ethnobotany, career opportunities, restoration principals, botany, plant disease and sanitation, invasive plant removal, wildcrafting, guest speakers and fieldtrips.

**GEP 445 RESTORATION ECOLOGY (5)**

Lecture and field course introducing major concepts and practical aspects of restoration ecology and land management. Topics include: the conservation context of restoration, restoration goals, measuring success, experimental approaches, dynamic systems and change over time, disturbance, restoring animal populations and the role of animals in ecosystem restoration, and educational elements of restoration. Practical techniques covered include: seed collection, ex-situ seed and plant management and propagation, invasive species removal, planting native species, and others. Topics are addressed in a variety of diverse local systems. Prerequisites: BIOL 130 and 131. Course fee.

**GEP 473 THERMAL ENERGY MANAGEMENT (3-4)**

An introduction to energy management in residential and commercial buildings, focusing on space heating and cooling, and hot water. Fundamentals of heat transfer, thermal properties of building materials, building load calculations, and energy economics. Prerequisites: MATH 160, MATH 161, or GEP 202; and PHYS 114 or PHYS 210A or equivalent.

**GEP 474 ELECTRICAL ENERGY MANAGEMENT (3-4)**

An overview of energy management approaches in residential and commercial settings that involve electrical devices, including lighting, motors, and HVAC. Fundamentals of electricity, electric power delivery, and the workings of common appliances; energy economics. Strong algebra background and PHYS 210 recommended. Prerequisites: MATH 160, MATH 161, or GEP 202; and PHYS 114 or PHYS 210A required.

**GEP 475 PASSIVE SOLAR DESIGN (3-4)**

Fundamentals and advanced applications of passive solar design, including: site analysis and design; passive applications (sunspace, trombe wall, convective loop, direct, and indirect gain systems); passive performance predictions; and economic payback analysis. Computer applications and student design projects. Prerequisites: GEP 473, junior- or senior-level standing or consent of instructor.

**GEP 476 SMALL SCALE ENERGY SOURCES (3-4)**

Course will focus on functional design of small-scale wind, photovoltaic, biomass, and hydroelectric energy sources. Siting, evaluating potentially available power, design of fully operable installation, and by-products and waste streams will be discussed. Energy storage mechanisms, interconnections to existing energy networks, and energy cost comparisons will be examined. Prerequisite: GEP 474, junior- or senior-level standing, or consent of instructor.

**GEP 477 COMPUTER APPLICATIONS IN ENERGY MANAGEMENT LABORATORY (4)**

Applications laboratory addressing state-of-the-art computer programs in this field. Focus on simulation-and-design programs utilized in residential and commercial building compliance. Student projects and presentations. Prerequisites: GEP 473, junior- or senior-level standing.

**GEP 490A HUMAN-ENVIRONMENT CAPSTONE PRE-SEMINAR (1)**

This field-based course is meant to help seniors prepare for original research associated with the Human-Environment Capstone Seminar the following semester. Through field practice, students learn how to formulate research hypotheses and/or questions. The course meets six times. Four meetings are four hours in duration and involve off-campus exercises. Prerequisite: Class open to GEP majors and seniors and graduate students only.

**GEP 490B HUMAN-ENVIRONMENT CAPSTONE SEMINAR (4)**

In this writing-intensive seminar, seniors formulate, propose, and conduct an original research project. Students then write a concise and professional report on their analysis and findings. We will also address professional development. Prerequisite: GEP 490A; Class open to GEP majors and seniors and graduate students only.

**GEP 491A ENVIRONMENTAL SYSTEMS CAPSTONE PRE-SEMINAR (1)**

This field-based course is meant to help seniors prepare for original research associated with the Environmental Systems Capstone Seminar the following semester. Through field practice, students learn how to formulate research hypotheses and/or questions. The course meets six times. Four meetings are four hours in duration and involve off-campus exercises. Prerequisite: Class open to GEP majors and seniors and graduate students only.

**GEP 491B ENVIRONMENTAL SYSTEMS CAPSTONE SEMINAR (4)**

In this writing-intensive seminar, seniors formulate, propose, and conduct an original research project. Students then write a concise and professional report on their analysis and findings. We will also address professional development. Prerequisite: GEP 491A; Class open to GEP majors and seniors and graduate students only.

**GEP 492A GLOBAL ISSUES CAPSTONE PRE-SEMINAR (3)**

Students develop the methodological skills they need to produce a group research and writing project in the Senior Capstone course for a focus on Global Issues. They formulate research questions, conduct literature reviews and evaluate analytical frameworks. Students are also introduced to software and techniques that are specific to the group research and writing process. Fall only. This is a prerequisite for GEP 492B. Cross-lists with GEP 496.

**GEP 492B GLOBAL ISSUES CAPSTONE SEMINAR (4)**

Students will produce a qualitative social science research project on a globally-relevant issue. Students will form several groups. Each group will conduct a different research project and produce a group-written capstone paper. Spring only. Prerequisite: GEP 492A. Cross-lists with GEP 498.

**GEP 493A PLANNING WORKSHOP (4)**

The first semester of an intensive, year-long project that provides practical experience in preparation of a general (comprehensive) plan for an actual community or geographic area. The fall semester focuses on background studies and field surveys of land use, public opinion, transportation, economic base, and environmental conditions. Class fee required at time of registration. Prerequisites: GEP 360 and 361, GEP seniors in Planning Concentration required. Course fee.

**GEP 493B PLANNING WORKSHOP (4)**

Continuation of GEP 493A. Spring semester focuses on preparation of the plan, including implementation programs, following state guidelines. Public presentations of class project. Class fee required at time of registration. Prerequisite: completion of GEP 493A.

**GEP 494 CAPSTONE: INTERNSHIP (4)**

Students produce a capstone project in their area of study while working in a county or city agency, or other organization. Credit is given with completion of three components, all pre-arranged in consultation with the internship coordinator. 1. Students will work 135 hours, verified through their direct supervisor. 2. Students will formulate, propose and conduct a research project in the context of that experience and write a concise and professional report on their analysis and findings. 3. Students will present that research orally. Must have senior-level standing and permission from the student advisor and the internship coordinator.

**GEP 495 SPECIAL STUDIES (1-4)**

Independent study designed in consultation with an instructor. Requires prior approval of GEP faculty member and department chair. Prerequisites: successful completion of at least two GEP courses and submission of a completed SSUspecial studies form; GEP majors or minors or consent of instructor. Course may be repeated for credit for up to 8 units.

**GEP 496 SELECTED TOPICS (1-4)**

Intensive study of selected topics related to geography, environment, and/or planning. Topics vary from semester to semester. May be repeated for credit with consent of instructor.

**GEP 497 SPECIAL TOPICS: LAB (2-4)**

A single subject or set of related subjects not ordinarily covered by the GEP Department. Offerings will vary depending on visiting faculty, experimental courses, and educational needs.

**GEP 595 GRADUATE SPECIAL STUDIES (1-6)**

Advanced research and writing. Students work under close supervision of faculty members. Subject matter variable. May be repeated for credit. Prerequisites: consent of instructor and completed special studies form.