

# Sustainability

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## Courses

Visit online course listings to view semester offerings for U19 SUST (<https://courses.wustl.edu/CourseInfo.aspx?sch=U&dept=U19&crslvl=1:4>).

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### U19 SUST 107 Environmental Geology and Energy

Environmental impact of current energy sources and potential for alternative energy sources. Energy production effects on global climate change. Interplay of natural and human-induced climate change. Fossil fuel sources and uses. Nuclear power generation and problems with nuclear waste disposal. Examination of proposed disposal sites. Alternative energy sources, including solar, wind, geothermal, and hydrogen, compared to fossil fuel and nuclear power use. Intended for non-science majors. Prerequisites: none.  
Same as U13 EPSc 107  
Credit 3 units.

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### U19 SUST 192 Understanding Exposure to Hazards for the General Public

This course covers the ways people are exposed to hazards such as asbestos, lead, arsenic, and radioactivity. The routes of entry include ingestion, inhalation, absorption through the skin, and crossing the placenta. When comparisons are made between perceptions of hazard and actual hazard, some hazards are overperceived and others underperceived. Hazards from natural sources are frequently underperceived, since natural sources are imagined to be safe, while things that are technological in origin are seen as more harmful. This course examines both how biomedical science determines the harm caused by these materials, and the sources and impacts of these exposures. Case studies include Chernobyl; Fukushima; lead in drinking water, soil and paint; occupational exposure to asbestos; mass groundwater arsenic poisoning; and radon.  
Same as U74 Sci 192  
Credit 3 units. UColl: OLI

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### U19 SUST 200 Introduction to GIS

This course introduces students to the fundamental principles and applications of geographic information systems (GIS), their underlying geospatial science and spatial thinking. This problem-based course explores applications of GIS to spatial questions in the areas of social science, business, the humanities and earth sciences. Example topics include understanding spatial data types; map coordinate systems and projections; basic spatial data analysis; acquiring, editing, creating and managing geospatial data; and processing and visualizing data using GIS. This hands-on course works through problems using ESRI ArcGIS software (primarily ArcGIS Pro), but other open source tools will also be introduced. Students who complete this course should be able to apply skills to think through a spatial problem and employ GIS tools to address it.  
Same as U90 GIS 200  
Credit 3 units. UColl: OLH, OLI

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### U19 SUST 203 Topics in Politics: Introduction to Global Climate Change in the 21st Century

The topic of this course varies by semester, dependent on faculty and student interests.  
Same as U25 PolSci 203  
Credit 3 units. UColl: OLI

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### U19 SUST 205 Foundations and Practice of Sustainability

This interdisciplinary course serves as an introduction to sustainability concepts, sustainability practice, and systems thinking. Students in this course will develop and articulate a common understanding of foundational sustainability concepts, including definitions, global challenges, human impacts, and approaches to sustainability solutions. Students will also start to understand and develop the competencies (knowledge, skills, attitudes) needed for success as a sustainability advocate or practitioner in professional settings, including systems thinking, strategic planning, group collaboration, and communicating the case for sustainability to various and specific audiences.  
Credit 3 units. UColl: OLH

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### U19 SUST 209 Introduction to Environmental Studies

This course examines the physical, chemical, and biological components of the environment. We will focus on the ecological principles that are the basis of environmental science. We will then explore how environmental studies incorporate concepts from politics, social sciences, economics, ethics, and philosophy. A central theme of the course is the effect of human societies on the environment, and how individual human and societal behavior can be modified to minimize the deleterious effects on the environment.  
Same as U29 Bio 209  
Credit 3 units. UColl: OLI

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### U19 SUST 2352 Environmental Ethics: Ecological Sustainability and Justice

This is a general survey of environmental ethics, an investigation of controversies about whether, how much, and how we ought to take the natural environment into account when making decisions about how to act and live, and in making political decisions. The first part of the course investigates what the natural (as opposed to human-made) environment is, and what value, if any, it has for human beings. The second part turns to considerations of environmental justice, or what is the fair way to distribute environmental goods (such as access to clean air and green spaces) and environmental burdens (such as exposure to industrial pollution or the financial cost of protecting nature) among people generally. The final part of the course will focus on sustainability, in particular on what sustainability is, whether it is achievable, and what, if anything, we should do in pursuit of it. Parts of the course will focus on the problem of environmental racism and related ecological crises in the greater St. Louis area, and students will have the opportunity to do their own research on local environmental problems, or others that impact them directly.  
Same as U22 Phil 2352  
Credit 3 units. UColl: ML, OLI

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### U19 SUST 301 Advanced GIS

This course is designed to move beyond fundamental data presentation and map production skills. Primary emphasis will be on applying fundamental GIS concepts, performing spatial analysis, developing proficiency with GIS software applications, resolution of problems, and efficient delivery of results. A semester project will provide experience in the planning and execution of real-world projects using geospatial technology. Course objectives include applying

fundamental GIS concepts, performing spatial analysis, developing proficiency with core ArcGIS software and selected extensions, resolution of problems, and efficient delivery of results. Completion of an introductory level GIS course is a prerequisite.  
Same as U90 GIS 300  
Credit 3 units.

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**U19 SUST 303 Digital Cartography**

In today's world, it is imperative that students develop the necessary skills to communicate their ideas to a large audience in an efficient manner. Graphics and visual representations are one of the most effective ways to neatly convey complex data sets to readers. This course presents both theoretical and hands-on mapping and graphical problems to students. Students will learn to solve these problems with self-created solutions. The course teaches students the basics of GIS-based mapping for producing publishable work. Students will develop basic skills in computer-aided mapping and computer drafting primarily using the ArcGIS Suite of desktop software, ArcGIS and Google online web mapping, and other tools. Students will also be introduced to other mapping or statistical programs as needed.  
Same as U90 GIS 303  
Credit 3 units. UColl: OLH, OLI

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**U19 SUST 3030 Introduction to Human Ecology**

Human ecology investigates the complex relationships between humans and their environment. The discipline is typically divided into two primary fields of research: cultural ecology (the study of cultural solutions to environmental challenges) and human biological ecology (the study of physical changes that occur in response to environmental stressors). This course examines both biological and cultural human adaptation to Earth's major ecosystems and surveys human subsistence strategies within these environments. Students will investigate the consequences of population growth, modernization, nutritional disparities, medical ethics, and environmental stewardship in a globalized world. The final section of the course will focus on world globalization, modernization, inequality, and health.  
Same as U69 Anthro 3030  
Credit 3 units. UColl: ML

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**U19 SUST 3032 Global Energy Policy: From Israel to Iran**

This course examines how the global energy markets operate and how energy policy is formulated, with a special focus on the Middle East. Students interested in working in the energy and/or policy world will gain a deeper understanding of the complexities involved in energy policy formulation and its profound impact on national security, the economy, and foreign policy. Students will deal with issues such as securing energy markets and suppliers, managing oil revenue, deciding on the country's fuel mix for electricity, promoting nuclear energy in the Middle East, engaging with environmental concerns, using energy resources as a "weapon" in foreign policy, subsidizing renewable energy, and the role of energy in war. After learning the basics of the energy market, students will focus on the major players in the Middle East and examine their energy markets -- from Israel to Saudi Arabia and Iran -- including the involvement of foreign actors such as the United States and Russia. They will then be tasked with writing their own op-eds and policy papers to try and influence the process of energy policymaking and to gain experience writing for different audiences. The course will include a guest lecture by an executive from a major coal producer operating in St. Louis (depending on availability) and an optional class visit to a renewable energy project near St. Louis.  
Same as U94 JME 303  
Credit 3 units. UColl: CD, OLI, PSI

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**U19 SUST 303M Introduction to Supply Chain Management**

Online version of the course U44 303; fulfills the same program requirements. This introductory course is designed to familiarize the student with the subject matter of procurement, forecasting, inventory management, enterprise resource planning, quality management, location selection, and supply chain integration and performance measurement. By the end of this course, students will have a foundation in SCM, and be prepared to determine if they want to pursue a career in SCM.  
Same as U44 Bus 303M  
Credit 3 units. UColl: OLI

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**U19 SUST 306 Translating Sustainable Business Practices**

The current opportunities for creating stakeholder value by embracing sustainable business practices may be the largest since the industrial revolution. In this course, students will learn about those opportunities, as well as the risks of inaction for generations to come. The goal of this course is to empower students with an understanding of how to validate the evolving and increasingly vital concepts within sustainability and resiliency, and to then direct that understanding towards business regeneration. Students will learn what it means for a business to prioritize planetary limits and nurture their social license to operate. The class will translate often less-familiar key performance indicators into the languages of the many participants who create the global economy. The times are changing-"sustainable business" is fast becoming "just business." We will be the change makers. This class does not expect any prior knowledge of business concepts or experience with traditional business skills.  
Credit 3 units. UColl: OLH, OLI

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**U19 SUST 3068 An Inconvenient Truth: The Human History of Climate Change**

Although global warming is unprecedented in its origin and potential consequences for human beings, climate change itself is actually nothing new. For thousands of years, entirely natural influences have altered Earth's climate in ways that shaped human history. The 18th-century advisors to the king of France were warning that deforestation would have an adverse effect on rainfall. The Little Ice Age that began in the 16th century altered settlement patterns, forced new trade networks, and encouraged innovations in agriculture. In this course, we will examine the longer history of climate change and how it has been addressed as a scientific, political, and environmental issue. We will look at such climate phenomena as the discovery of the Green House Effect, El Niño events in the late 19th century, and glacial melting in the 20th century. This course will also introduce students to the field of environmental history and explore how the methods of this field of inquiry challenge traditional historical categories. We will consider the following questions: What happens when time is no longer bound by the written word and is understood in geological terms? How does history play out when the actors driving the action of the story are non-human? How might historians geographically frame their narratives when the subject matter is rarely bound by the political borders of human communities?  
Same as U16 Hist 3068  
Credit 3 units. UColl: HSM, HTR

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**U19 SUST 310 GIS Programming**

This course introduces students to the use of programming in desktop and web geographic information systems (GIS). The course will be divided into two units: the first unit will focus on scripting for task automation, while the focus of the second unit will be web development. Topics include general programming concepts, using spatial libraries for both Python and R, the ArcGIS API for JavaScript, Leaflet, and consuming and publishing map services. Prerequisite: Introduction to GIS (U90 GIS 200) or Applications of GIS (EnSt 380/580).  
Same as U90 GIS 310

Credit 3 units. UColl: OLH

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### U19 SUST 313H Open Source GIS

Online hybrid version of the course U90 313. This course explores the open source options available for GIS users. Most students learn GIS on ESRI's ArcGIS platform. While robust, ArcGIS comes with a heavy price tag and may not be feasible for all GIS users. In this course, we will not only learn about how to find open source (free) GIS software, we will also learn how to use four of the major platforms available. We will start by learning QGIS, which is comparable to ESRI's ArcMap/ArcGIS Pro. Students will become intermediate users of QGIS. During the second half of the semester, we will spend time learning R, GeoDa and GRASS GIS. Prerequisite: an introductory GIS course or permission of the instructor.

Same as U90 GIS 313H

Credit 3 units. UColl: OLH, OLI

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### U19 SUST 315 Introduction to Historic Preservation

This course explores the history and practice of historic preservation with an emphasis on regional urban issues and the way in which historic preservation contributes toward the development of sustainable communities. Students are exposed to a diverse range of preservation topics that will enable them to apply sound historic preservation principles in professional practice. Course topics include: evaluation and recording of historic properties and districts; Secretary of the Interior's standards in the process of planning or designing a project; historic preservation in community planning; application process for state and federal tax credit programs; conservation of historic building materials; historic preservation vs. modern building codes and user requirements. We examine case studies of completed projects or projects in progress.

Credit 3 units.

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### U19 SUST 317 Urban Ecology: Principles and Practice

More than half of the world's population now lives in an urban environment. Studies have shown that connecting to nature can benefit people, and savvy municipalities are attuned to the positive role that ecology can play in the urban core. How can people and nature co-exist in ways that are mutually beneficial? In this intensive course, students will examine multiple techniques and applications of urban ecology. Class time will be used to review and discuss urban ecology principles from the readings and visuals. Local excursions — such as to Forest Park, Citygarden and Cortex — will present opportunities to personally experience urban ecology practices. Students will be expected to make their own field trip arrangements, but assistance will be provided with public transportation options. As their final course project, students will develop an urban ecology project proposal and design. The course is designed as an urban ecology overview and foundation — (1) What urban ecology is: underpinning and forerunners in the field, (2) Why urban ecology is important: potential benefits (social, economic, environmental), (3) How urban ecology is being applied: implementation techniques and approaches.

Credit 3 units.

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### U19 SUST 319 Planning Sustainable & Racially Equitable Urban Communities

This course explores principles, ethics and practice for planning sustainable and equitable urban communities. Learning how to manage resources for both current and future generations, students will gain greater understanding of the importance of integrating environmental, economic, social and institutional efficiency. With a focus on communities in the St. Louis region, students in this course will focus on equity and community capitalism aimed at ensuring that fairness and well-being are inclusive for all people in providing for health, safety and the built environment. You will learn to integrate and utilize a racial equity lens, trauma-informed approaches, cultural

competence and Anti-Bias/Anti-Racism practices to help lead to better decision-making and creating solutions aimed at reducing adverse impacts on the environment, preventing gentrification, improving the welfare of people, and shaping urban areas and neighborhoods into healthier, robust and more equitable communities. This course will prepare the student to be a leader-advocate for sustainable urban planning and community development, whether as an elected or public official, a professional staff person, or a citizen volunteer.

Credit 3 units. UColl: ML, OLH, OLI

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### U19 SUST 324H Principles of Project Management

Online hybrid version of the course U44 324. This course provides students with a foundation in project management centered on developing their skills and capabilities. Students will gain competencies in planning, controlling, scheduling, resource allocation, budgeting, and performance measurements, utilizing tools and techniques to manage challenges throughout the project life cycle. Students will also examine the roles of the project manager, project teams, and stakeholders in the development of the project scope, up to and until project closure. A hands-on group project will provide students with the experience of managing a project.

Same as U44 Bus 324H

Credit 3 units. UColl: OLH

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### U19 SUST 325 Introduction to Resilience

Resilience signifies the capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of disturbances whether natural (such as tornadoes, hurricanes, earthquakes) or man-made (such as civil unrest, economic downturn, aging infrastructure). This course will explore multiple aspects of resilience from social, environmental and infrastructure perspectives. Social resilience reinforces the role of communities in building resilience, environmental resilience examines the role of natural systems to serve as mentors for resilience, and infrastructure resilience looks at the role of built structures and systems in fostering resilience. We will examine common attributes that build resilience across different perspectives (social, environmental, infrastructure) and settings (e.g., city, neighborhood, building). Resilience and related course themes apply to a wide range of disciplines and experiences — environmental studies, history, urban planning, business, political science, design, to name a few — and students will be guided to apply course skills and strategies to their own interests and goals.

Credit 3 units.

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### U19 SUST 328 Environmental Law: Applications Toward Sustainability

This course provides an overview of significant environmental legal and policy issues. It will be taught from a sustainability practitioner's perspective, linking environmental law to sustainability applications. The content touches on both environmental hazards and natural resource issues, and they will be discussed within the scope of both a legal and sustainability framework. The goal of the course is to provide the students with a general understanding of numerous environmental issues — such as they might encounter in the field of sustainability — and to help them develop the knowledge and tools that will be useful in addressing those environmental issues.

Credit 3 units. UColl: OLH, OLI

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### U19 SUST 3312 Environmental and Energy Issues

This course considers the major issues in these increasingly important areas of public policy. We discuss the importance of political processes and actors on such phenomena as global warming, endangered species, and public lands. This course emphasizes the American experience but also considers international implications.

Same as U25 PolSci 3312

Credit 3 units. UColl: OLI, PSA

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**U19 SUST 332 Conservation Biology and Biodiversity**

This overview of the fields of conservation biology and biodiversity covers topics such as species preservation, habitat restoration, refuge design and management, and human population growth. This course does not count for day students or toward the undergraduate biology major. Prerequisite: General Biology I or permission of instructor.

Same as U29 Bio 432

Credit 3 units. UColl: OLI

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**U19 SUST 3322 Sustainability Policy**

Same as U25 PolSci 3322

Credit 3 units.

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**U19 SUST 337 Sustainable Food Systems Thinking**

Planning a more sustainable future and an equitable and healthy present requires us to critically examine the current food system and to understand the key challenges it faces in a world of rapid urbanization, population growth, and climate change. What does the future of food look like, and how are food visionaries working to change that future now? In this course, students will learn to articulate the multiple facets of the food system and how they intersect with frameworks of sustainability, history, health and nutrition, policy, technology, culture, food activism, and biodiversity. We examine our own personal food behaviors to illuminate challenges at the individual level so that we can begin to scale up solutions. We will study the approach of change makers in this field and look at ways to integrate food-systems thinking into multiple aspects of both personal life and professional practice. This course fulfills the Social Science General Education requirement for University College undergraduate students.

Credit 3 units. UColl: SSC

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**U19 SUST 3402 Influencing Public Policy on Climate Change**

We have ten years to cut greenhouse gas pollution in half to avoid the worst impacts of climate change. To achieve these reductions, massive public policy changes must be made, including switching electricity generation from fossil fuels to wind and solar, adopting aggressive building energy efficiency standards, protecting forests and prairies, and electrifying the transportation sector. This class will teach students how to design winning campaigns to change public policy at the local, state, and federal levels to drastically cut carbon pollution. Students will be able to apply this learning in a variety of settings, including climate advocacy, clean energy deployment, public health, civil rights, and reproductive rights.

Same as U25 PolSci 3402

Credit 3 units. UColl: PSA

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**U19 SUST 344 Global Development and Sustainability**

This course examines those activities, public and private, designed to bring a greater quality of life to an area, region or country and the people living there. While broad in scope, the discipline of Development can be focused in four ways. The first and broadest is economic development and in particular foreign aid, economic interventions, and the rise of the multinationals. The second focus looks at the cultural dimensions of development and in particular globalization, indigenous cultures, and the development of the new localism. The third explores the political dimensions of development with a particular attention to the systems and models of local, national and regional politics. The fourth analyzes the technological dimension of development with special emphasis on agricultural and communications technologies. By looking at how the field of global development has shifted toward sustainability, we will study principles and practices of sustainable development, particularly in the context

of global challenges, exploring these economic, cultural, political, and technological dimensions. We will apply models and methods to contemporary cases in first, third, and second world cultures that involve business, government, nonprofit organizations, and NGOs. Credit 3 units.

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**U19 SUST 3463 Global Health Issues**

This course is designed to inform and challenge participants to observe and solve problems relating to world health issues while teaching basic biology concepts. Participants will investigate barriers to solving problems of Nutrition, Infectious disease and Environmental factors that prevent progress of global communities. They will also research new technologies being developed that could potentially provide solutions as well as create an ideal lesson using global health issues the focus. Open to Post-Bacc Students. Prerequisite: General Biology I or permission from the instructor.

Same as U29 Bio 463

Credit 3 units. UColl: OLI

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**U19 SUST 355 Environmental Economics**

Environmental economics is a subfield of economics concerned with environmental issues, both theoretical as well as applied and public-policy oriented. Central to environmental economics is the concept of market failure, particularly the existence of externalities. Correcting for externalities and crafting acceptable public-policy responses will be a central focus of this course. Topics explored will include consumer theory and valuation; pollution and production theory; environmental protection and welfare; the Coase Theorem; resource management; and economic growth and environmental sustainability. Prerequisite: U07 1011 or equivalent.

Same as U07 Econ 355

Credit 3 units.

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**U19 SUST 3610 Culture and Environment**

An introduction to the ecology of human culture, especially how "traditional" cultural ecosystems are organized and how they change with population density. Topics include foragers, extensive and intensive farming, industrial agriculture, the ecology of conflict, and problems in sustainability.

Same as U69 Anthro 361

Credit 3 units. Arch: SSC Art: SSC BU: ETH EN: S

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**U19 SUST 364 Global Sustainability**

Global Sustainability explores our relationship with planet earth. Taking an ecological systems perspective, this course provides students with the knowledge and understanding of the scientific, cultural, social, political, economic, and technological conditions that affect the quality of life on our planet. Due to the cross-disciplinary nature of these conditions and issues, the course will touch on many different subject areas, including ecology, conservation biology, economics, and political science. The overarching theme of environmental sustainability will be interwoven throughout the course. Topics covered include an overview of the global commons, ecosystem integrity and health, the human footprint, biodiversity and human health, the pollution and degradation of the global commons, ecological economics, the international system and environmental politics, resource management, and sustainable development.

Same as U29 Bio 364

Credit 3 units. UColl: OLI

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**U19 SUST 3641 Strategic Planning**

All successful businesses have a strategy--this course will teach you how to create one. Whether you are a student who wants to understand how business works, an entrepreneur developing a business, or an experienced manager who would like to implement practical

approaches to strategic planning and critical thinking, this course will help you on your journey. Leading-edge strategic planning tools and templates will help you tackle the tough issues of today and the future. The course will emphasize how to create, implement, and manage successful change within organizations. Using case studies and examples from industry leaders, you will build critical thinking skills and use fundamental principles and tools that relate to successful strategic planning and decision making. You will develop written and oral presentation skills in the context of strategic planning; understand how to motivate the organization; and design and receive feedback on a draft strategic plan that can fit almost any situation.

Same as U44 Bus 364

Credit 3 units.

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**U19 SUST 368 Sustainability as Transformative Agent in Business and Public Policy**

This course examines how sustainability drives and is driven by public policy and business. Participants will acquire skills and techniques to apply sustainability in the marketplace, concentrating on public and business organizations. We will explore how profit drives sustainability as a business practice and whether it assists or interferes with public policy objectives around environment, public health, jobs, social mobility, and economic development. As a culminating project, students will develop a sustainability proposal either for government or the private sector.

Credit 3 units.

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**U19 SUST 3795 Anthropology and Climate Change: Past, Present and Future**

This course provides an overview for interplay between humanity and global climate change that encompasses three-field anthropological subjects. Course material includes the role of climate change in shaping human evolution, human solutions to climatic challenges through time, the impact of human activities on the climate, and modern sociocultural examinations of how climate change is affecting the lives of people around the world.

Same as U69 Anthro 3795

Credit 3 units. UColl: OLI

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**U19 SUST 380 Environmental Justice in the Anthropocene**

In recent years, the impacts of the Anthropocene -- the era of human disruption of the global environment -- are becoming increasingly apparent. The news is full of reports of massive wildfires, devastating hurricanes, floods, droughts, extinctions, and more. However, not all humans share the same risks or experience equivalent burdens from hazards associated with the Anthropocene. In this course, we will explore these unequal experiences of environmental hazards through the lens of environmental justice (EJ). EJ is both a field of scholarship and a social movement. It emerged in the 1970s and 1980s in response to the growing realization that poor and marginalized communities often experience disproportionate, harmful impacts from exposure to toxic waste. Since then, EJ scholars and activists have worked to document and understand cases in which environmental hazards compound the burdens of poverty, racism, gender discrimination, and other forms of social inequality. This seminar will focus on environmental hazards that have been caused directly or indirectly by humans, including hurricanes, rising sea levels, and toxic waste exposure. Most of the examples that we explore will come from North America, but we will also discuss ideas and concepts that are applicable elsewhere in the world.

Same as U69 Anthro 380

Credit 3 units. UColl: ML, OLI

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**U19 SUST 381 Evolutionary Medicine**

Evolutionary Medicine examines how human evolution relates to a broad range of contemporary health problems including infectious, chronic, nutritional, and mental diseases and disorders. The primary goal of the course is to compare modern human environments and behaviors with the conditions under which humans evolved to determine the extent to which medical conditions of the present may be a consequence of adaptation to different conditions of the past.

Hybrid online.

Same as U29 Bio 481

Credit 3 units.

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**U19 SUST 398 Honors Research in Sustainability**

Part I of the Honors Thesis. Requires admission to the Honors Program in University College and a signed proposal.

Credit 3 units.

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**U19 SUST 411 Tropical Ecology**

This course examines the terrestrial and marine ecosystems of the tropics, focusing predominantly on the Neotropics. We examine the biological and ecological processes that influence ecosystem dynamics and biodiversity within representative communities. We discuss issues of conservation, sustainable development and resource use, and the human impact on these fragile ecosystems. Prerequisite: General Biology I or permission of instructor.

Same as U29 Bio 4111

Credit 3 units. UColl: OLH, OLI

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**U19 SUST 413 Environmental Science: Regional and Global Perspectives**

This course examines the interrelationships between humans and their environment, moving from local and regional views up to a global perspective. Taking an ecosystem approach, the course starts with the basic ecological principles necessary for understanding our environment. We will then explore how environmental science incorporates concepts from politics, social sciences, economics, ethics, and philosophy; physical and biological resources; conservation, management, sustainability, and restoration; population principles; environmental economics; human impacts (especially pollution and disturbance); environmental health and toxicology; and environmental policy. Lectures and discussions will focus on the major issues involved in environmental challenges, drawing on current, carefully selected articles from some of the most respected magazines, newspapers, and journals published today. Prerequisite: General Biology I or permission of the instructor.

Same as U29 Bio 413

Credit 3 units. UColl: OLI

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**U19 SUST 4140 Sustainable Development and Conservation: Madagascar**

This course focuses on sustainable development in rural subsistence economies, using Madagascar as case study. Students from diverse disciplines are challenged to develop and assess the feasibility of projects that can have a positive impact on communities constrained by poverty traps. The span of projects includes topics such as forest conservation and use, nutrition, health, food security, clean water, education, and bottom-up economic growth. Students in humanities, social sciences, business, design, engineering, physical sciences, law, social work, economics, political science, public health and others use their different perspectives to search for answers. Teamwork and peer teaching are central to the course. Competitively evaluated projects will be field-tested in Madagascar. Selected teams will travel to Madagascar in May and work with the Missouri Botanical Garden Community Conservation Program to adapt projects to conflicting environmental, cultural, economic, and political factors. Poster board

sessions for students taking the trip occur in the fall term. Project teams selected to go to Madagascar will be assessed a lab fee at the time their participation in the trip is confirmed. The lab fee covers the cost of airfare, in-country transportation, and approximately three weeks of in-country lodging and food. Undergraduate students should register for the course using one of the undergraduate cross-listed course numbers.

Same as U85 IA 5142

Credit 3 units.

is a 3-unit experiential course, faculty supervised and tailored to each student's professional goals, that applies concepts and skills from earlier courses to a hands-on sustainability project in a work or studio setting.

Credit 3 units. UColl: OLH

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### **U19 SUST 419 Ecology**

Community ecology is an interdisciplinary field that bridges concepts in biodiversity science, biogeography, evolution and conservation. This course provides an introduction to the study of pattern and process in ecological communities with an emphasis on theoretical, statistical and experimental approaches. Topics include: ecological and evolutionary processes that create and maintain patterns of biodiversity; biodiversity and ecosystem function; island biogeography, metacommunity dynamics, niche and neutral theory; species interactions (competition, predation, food webs), species coexistence and environmental change. The class format includes lectures, discussions, and computer labs focused on analysis, modeling and presentation of ecological data using the statistical program R. Prereq: Bio 2970 required, Bio 381 recommended, or permission of instructor.

Same as U29 Bio 419

Credit 3 units. UColl: OLI

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### **U19 SUST 421 Spatial Data Modeling and Design**

This course expands on the fundamental principles of geographic information systems (GIS) and introduces advanced spatial database concepts and a visual programming environment for automating geoprocessing tasks. The course is divided into two parts: the first exploring spatial database design with emphasis on the ESRI Geodatabase, and the second focusing on automating workflows using ESRI ModelBuilder. Topics include data needs assessment; conceptual modeling, logical design, and physical implementation; using models to perform multi-step spatial analyses; and the automation of repetitive processes with iteration tools. Lectures are supplemented with lab exercises to develop proficiency and problem-solving skills using ArcGIS software and associated tools. Prerequisite: the course should be taken after or concurrently with Advanced GIS (U90 GIS 300).

Same as U90 GIS 421

Credit 3 units. UColl: OLH, OLI

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### **U19 SUST 435 Applications in Imagery Analysis**

This course exposes students to the range of applications of imagery analysis. Topics will include remote sensing concepts and instrumentation; the history of aerial photography and satellite remote sensing; and common techniques and workflows used to prepare and perform such tasks as digital imagery processing, imagery classification, and change detection. Furthermore, students will be introduced to industry applications and learn about the remote sensing job market. Students will perform hands-on lab activities to reinforce the concepts covered in lectures and readings. Students will also have the chance to interact with professionals in the field through guest lectures. Most activities will be performed using ArcGIS Pro software and extensions.

Same as U90 GIS 435

Credit 3 units. UColl: OLI

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### **U19 SUST 450 Sustainability Capstone**

This is the required capstone/practicum course for the Bachelor of Science in Sustainability, Certificate in Sustainable Environment and Science, Certificate in Sustainable Management and Organizations, and Certificate in Sustainable Communities and Development. This