

Fall 2020 Course Descriptions as of 04/05/2020 08:14 PM

Information in Browse Course Catalog is subject to change. Information is term specific. Please refer to the appropriate term when searching for course content. Key to Course Descriptions may be found at: http://rcs.registrar.arizona.edu/course_descriptions_key.

Renewable Natural Resources (RNR)

RNR 101: Global Sustainability and Natural Resources (3 units)

Description: Only for students who have not taken RNR 150C1 (Sustainable Earth: Natural Resources and the Environment). See University General Education, Tier One. Life support systems on planet Earth are becoming progressively more challenged by a global population that recently exceeded 7 billion people. With a focus on natural ecosystems, we will explore how society deals with threats to the planetary goods and services on which life depends. Sustainability lies at the intersection of the environment, society and economics. We will explore environmental, societal and economic strategies humans might develop to become effective stewards of our natural resources and achieve a sustainable Earth.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall

RNR 140: Geospatial Concepts and Naval Applications (1 unit)

Description: This course is funded through a grant to UA from the Office of Naval Research entitled "Inspiring the Next Generation of Naval Scientists and Engineers in NROTC Battalions through Undergraduate Navy-Relevant Geospatial Experiences". The 1-credit course is a basic introduction to geospatial technology and will include 7 weeks of study with approximately 20 contact hours and 30 hours of student homework. The course will be highly participatory involving hands-on practical experience using geospatial technology. Students will be introduced to the concepts of geospatial technology with a focus on applications that are relevant to the Navy and naval officers. The South China Sea will serve as a case example for course activities.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$40

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 142: Geospatial Research LAB Practicum for Naval Applications (1 unit)

Description: The 1-credit course is a lab practicum designed to give students supervised and practical experience applying the concepts and theory previously studied in RNR140: Geospatial Concepts and Naval Applications. Students will work in teams to complete geospatial "challenge" projects that are relevant to the Navy and naval officers. Projects will involve interaction with mentors from Raytheon Missile Systems, student veterans, and UA faculty and staff. The South China Sea will serve as a topic for the projects and other course activities.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$40

Course Components: Laboratory Required

Course typically offered:

Main Campus: Spring

Enrollment requirement: RNR 140

RNR 150C1: Sustainable Earth: Natural Resources and the Environment (3 units)

Description: Life support systems on Earth are challenged by a growing global population. We will explore through lectures and discussion, the strategies humans might develop to become effective stewards of our natural resources and achieve a sustainable Earth.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall, Spring, Summer

General Education: INDV 103

RNR 160D1: Wildlife, Conservation, and American Culture (3 units)

Description: Wildlife, Conservation, and American Culture explores the significance of wild animals in society as reflected in governmental agencies and laws, how people spend their time and money, and in the social controversies that stem from efforts to conserve animal populations in the face of human development.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Discussion May Be Offered
Lecture Required

Course typically offered:

Main Campus: Fall, Spring, Summer

General Education: TRAD 104

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 170C1: Our Place in Nature: Biology and the Environment (3 units)

Description: This course involves the study of nature. Our goal is to understand how living things and physical processes interconnect to produce the environments we live in. We explore the relevance of biology to contemporary issues in human society and the prospect of science-based solutions to problems in the environment, medicine, and agriculture.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Spring, Summer

General Education: NATS 101

RNR 193: Internship (1 - 8 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 194: Practicum (1 - 3 units)

Description: The practical application, on an individual basis, of previously studied theory and the collection of data for future theoretical interpretation.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 195A: Careers in Conservation: Wildlife, Plants, & Water (1 unit)

Description: The course will provide students with an overview of the state of natural resources (e.g., wildlife, plants, and water) in North America, and the framework under which these resources are conserved and managed in the United States. Selected professionals will present case studies of important and current challenges in conservation and management, and discuss how students might make a difference in their disciplines.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Course typically offered:

Main Campus: Fall

RNR 199: Independent Study (1 - 3 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

RNR 200: Conservation of Natural Environments (3 units)

Description: Historical and philosophical developments in natural resources management; socio-political, economic, and ecological factors affecting resource use; the role of people and organizations in conservation of resources such as rangelands, forests, water, fish and wildlife.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall, Summer

Recommendations and additional information: Two (2) courses from Tier One - Individuals & Societies (Catalog numbers 150A, 150B, 150C).

General Education: Tier 2 Individuals & Societies

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 230L: Field Botany Laboratory (1 unit)

Description: This course covers the skills and information required to function as a botanist in the field. It involves the direct application of the botanical knowledge concurrently presented in 230R. The course includes laboratory, and group and individual field exercises and emphasizes practical plant identification and field botanical skills. RNR 230R is open to students in all majors and is a core course in the Natural Resources undergraduate curriculum in the School of Natural Resources. The course has two mandatory Saturday field trips.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$10

Course Components: Laboratory Required

Course typically offered:

Main Campus: Fall

Field trip: Two mandatory Saturday field trips.

RNR 230R: Field Botany (2 units)

Description: In this course we address fundamental knowledge that supports the study and appreciation of plants in their natural environments. Emphasis is placed on species found in the southwestern United States. The course begins with the fundamental elements of plant growth, development, physiology, and reproduction. Using this foundation, we then cover plant identification and taxonomy, and how environmental factors affect plant growth, distribution, and assemblage into communities. We conclude with a consideration of roles played by plants in ecological processes and how human-driven processes affect these processes. RNR 230R is open to students in all majors and is a core course in the Natural Resources undergraduate curriculum in the School of Natural Resources & the Environment

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: RNR 230

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 256: Sustainable Cities and Societies (3 units)

Description: Urbanization and cities within the sustainability framework. Global urbanization, social justice, environmental equity, growth management, "the new urbanism." International cases. Web based projects.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: GEOG 256, PLG 256, PLN 256

Also offered as: GEOG 256, PLG 256

Course typically offered:

Main Campus: Fall, Spring

Home department: Planning

General Education: Tier 2 Individuals & Societies

RNR 293: Internship (1 - 8 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 294: Practicum (1 - 8 units)

Description: The practical application, on an individual basis, of previously studied theory and the collection of data for future theoretical interpretation.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 299: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 310: Agave, Cacti, and Other Succulents of Southern Arizona (2 units)

Description: A survey of the Agave, Cacti, and other succulents of southern Arizona both native and common landscaping plants. The course will include the natural history, identification, and physiology as well as the practices for propagation and common uses.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Summer

Recommendations and additional information: There are no prerequisites or co-requisites but some limited knowledge of plant identification will be needed. Check with an instructor if you are unsure if you have the needed skills.

RNR 316: Natural Resources Ecology (3 units)

Description: Principles of plant, animal, and community ecology important to the understanding and management of renewable natural resources.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
---------------------------	---------	----------

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: ECOL 182R, ECOL 182L, RNR 230.

RNR 321: Ecological Surveys and Sampling (3 units)

Description: General principles for quantifying attributes of natural resources in ways that facilitate conservation and management. Fundamentals of sampling design, field surveys, data collection, and data analysis, with emphasis on methods for plant and animal populations. Explore how sampling design affects the scope of inference and quality of data that result from a study.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$40

Course Components: Laboratory Required

Lecture	Required
---------	----------

Course typically offered:

Main Campus: Spring

Enrollment requirement: Prerequisite or concurrently enrolled in: MATH 163 or MATH 263, AREC 239, SBS 200, PSY 230, or equivalent.

-SA represents a Student Abroad & Student Exchange offering

-**CC** represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 322: Field Methods in Natural Resources and the Environment (2 units)

Description: This course provides experience with a wide array of field sampling and study design methods for natural resource management and policy-making. Over two days in the classroom and eight days in the field, students will gain experience with field and lab techniques in wildlife and fisheries, vegetation sampling, soil and carbon dynamics, range management, hydrology, and GIS. These topics will allow students within a given sub-discipline to gain practical field experience with other sub-disciplines. Recent wildfires will serve as an example of a landscape-scale process that has indirect and direct effects on almost all natural resources. The course will highlight how natural systems are interrelated, demonstrating that natural resource decisions cannot be made in isolation. How do managers and researchers collect, synthesize, and present data? How do data shape decision-making processes? How do natural resource managers balance multiple natural resource concerns and administrative complexity in dynamic ecosystems? This course will address all of these issues through classroom learning, field experiences, and in-person meetings with researchers, conservation practitioners, and natural resource managers.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$350

Course Components: Laboratory Required

Course typically offered:

Main Campus: Summer

Recommendations and additional information: Recommended: RNR 200, RNR 230R and L, Upper division course in Ecology.

Field trip: Part of course will be eight days of field camp at Rucker Station (elevation: 5700 feet) in the Chiricahua Mountains, three hours southeast of Tucson.

Enrollment requirement: ECOL 182R and ECOL 182L or equivalent.

RNR 335: Introduction to Geospatial Concepts and Defense Applications (3 units)

Description: The 3-credit course is a basic introduction to geospatial technology and concepts with an emphasis on its use in defense and security. The course will be highly participatory involving hands-on practical experience using geospatial technology. Students will be introduced to the concepts of geospatial technology with a focus on applications that are relevant to military officers and others interested in defense and security.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: There are no course prerequisites and no courses must be taken simultaneously with this course. However, enrollment in a Reserve Officer Training Corps (ROTC) program or having an understanding of military operations is recommended.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Agriculture and ranching have had a significant impact on the history and environment of the western United States. In popular culture, ranching is viewed both as a romantic representation of our western, pioneer heritage and as a symbol of environmental destruction. This course examines how modern agriculture and ranching fits with these perceptions by developing an understanding of what has been termed "conservation ranching." We will review how agriculture is practiced in the Southwest and the relationship between agriculture and sustainable land use. The focus is on ranching because it is the predominant land use in rural Arizona and other western states, but we will touch on sustainable farming practices throughout the semester.

Main Campus: Spring

Honors Course: Honors Contract

Writing Emphasis: Writing Emphasis Course

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 355: Introduction to Wildland Fire (3 units)

Description: The course aims to provide students with a broad, balanced understanding of fire as a biophysical process. We will explore fire from many perspectives, including physics, ecology, biogeography, management, policy, and economics. The course will strive to make our study of fire interesting and relevant in the contemporary world by examining how such factors as climate change, invasive species, and land use influence how fire interacts with the landscape. We will examine a variety of fire management strategies including fire suppression, prescribed fire, wildland fire use, and landscape restoration ecology. The course will provide a global perspective on fire, with primary emphasis on ecosystems of western North America.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Spring

Recommendations and additional information: MCB 181R, ECOL182R. A course in ecology is recommended, but not required.

RNR 384: Natural Resources Management Practices (3 units)

Description: Introduction to resource management practices used to achieve societal goals. Includes practices used to produce water, wood, forage, wildlife and other renewable resources; to protect water, soil, wilderness and scenic attractions; and to mitigate the adverse impacts of management and land-use activities on the environment.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Basic ecology course, RNR 316 or RAM 382.

RNR 392: Directed Research (1 - 6 units)

Description: Individual or small group research under the guidance of faculty where students complete a substantive part of the research and analysis and a final report.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 6 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 393: Internship (1 - 8 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 394: Practicum (1 - 8 units)

Description: The practical application, on an individual basis, of previously studied theory and the collection of data for future theoretical interpretation.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 397A: Sustaining Local Food, Biodiversity, and Livestock Grazing in the Alps (3 units)

Description: The Italian and Swiss Alps provide a living, and easily accessible example of how a food and livelihood system can also support increased biodiversity in grasslands. Through field trips to farms, pastures, and mountain lodges (rifugi) we will assess how the decline of human populations in the Alps leads to the abandonment of grazing, followed by declines in the biodiversity of grassland plants, insects and birds, declines in the provision of local cheeses, and declines in the associated culture of alpine pastoralism. We will also explore how new initiatives are supporting the continued grazing of the grasslands, continued support of high biodiversity in the grasslands, continued provision of local cheeses and other foods, and continued opportunity for livelihood in the alpine region. In the end, we will explore how investments from local organizations and the European Union are being used to sustain this livelihood system in order to maintain biodiversity, local food, and the mountain culture for future generations.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Workshop Required

Course typically offered:

Main Campus: Summer

Community Campus: Summer

Enrollment requirement: Sophomore, Junior, or Senior status only.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 399: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 400: Noxious, Invasive Plants of Arizona (3 units)

Description: An overview of the impacts and management strategies and tactics for noxious, invasive plants in (or near) Arizona.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: PLS 400

Course typically offered:

Main Campus: Summer (odd years only)

RNR 403: Applications of Geographic Information Systems (3 units)

Description: General survey of principles of geographic information systems (GIS); applications of GIS to issues such as land assessment and evaluation of wildlife habitat; problem-solving with GIS.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components: Laboratory Required
Lecture Required

Equivalent to: GEOG 403

Also offered as: GEOG 403

Co-convened with: RNR 503

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: Basic computer application skills required.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 407: Insect Discovery (3 units)

Description: Insect Discovery is a special course that combines an introduction to insect biology with practical experience in science outreach. Students will learn insect biology through lectures, labs and field trips, and communicate their knowledge to elementary school children by leading hands-on, inquiry-based science activities.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Laboratory	Required
	Lecture	Required

Also offered as: ENTO 407

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Previous biology course work is necessary.

Field trip: Field trip to the Tucson Botanical Gardens and various insect collecting trips.

Home department: Entomology

Student Engagement Activity: Professional Development

Student Engagement Competency: Professionalism

RNR 416A: Computer Cartography (3 units)

Description: Introduces the principles of map design, production and analysis.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory	Required
	Lecture	Required

Equivalent to: PLAN 481, RNR 416A

Also offered as: GEOG 416A

Co-convened with: RNR 516A

Course typically offered:

Main Campus: Spring

Home department: School of Geography and Development

Student Engagement Activity: Professional Development

Student Engagement Competency: Professionalism

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 416C: Urban Geographic Information Systems (3 units)

Description: Introduces concepts and application skills for use of geographic information systems to investigate a range of urban spatial issues and decision-making processes. Emphasis on complete process of GIS-based problem solving, including project planning, spatial data sources/acquisition, preparation/coding, analysis, representation, and communication.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory	Required
	Lecture	Required

Equivalent to: RNR 416C

Also offered as: GEOG 416C

Co-convened with: RNR 516C

Course typically offered:

Main Campus: Spring

Home department: School of Geography and Development

Enrollment requirement: RNR/GEOG/SWES 417.

RNR 416D: PPGIS: Participatory Approaches in Geographic Information Science (3 units)

Description: A project-based course focusing on applications and impacts of GIS and other spatial analysis technologies in grassroots community development, participatory decision making, and community-engaged social science. Class format includes discussion seminar, GIS workshop, collaboration, and out-of-classroom community involvement.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: RNR 416D

Also offered as: GEOG 416D

Co-convened with: RNR 516D

Home department: School of Geography and Development

Enrollment requirement: RNR/GEOG/SWES 417.

Student Engagement Activity: Community Partnership

Student Engagement Competency: Innovation and Creativity

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 416E: Geovisualization (GIS) (3 units)

Description: Introduces principles and practices of Geovisualization (Geoviz) and softwares (Community and ERDAS Image).

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: RNR 416E

Also offered as: GEOG 416E, GIST 416E

Co-convened with: RNR 516E

Course typically offered:

Main Campus: Fall, Spring

Home department: School of Geography and Development

Enrollment requirement: GEOG/RNR 416A or RNR/GEOG 417.

Student Engagement Activity: Creative Expression

Student Engagement Competency: Diversity and Identity

RNR 416F: GIS for the Social Sciences (3 units)

Description: An advanced course for students who want to integrate social science data and geographic information science into their research or work life. The course is presented in a lecture/laboratory format. The lecture portion will deal with conceptual issues necessary for the integration of social science data and approaches within a GIS framework. The laboratory portion will provide practical experience with GIS software products used for the development and analysis of spatially-referenced social science data sets.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory	Required
	Lecture	Required

Also offered as: GEOG 416F

Co-convened with: RNR 516F

Course typically offered:

Main Campus: Fall

Home department: School of Geography and Development

Enrollment requirement: RNR/GEOG/SWES 417.

Student Engagement Activity: Discovery

Student Engagement Competency: Professionalism

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 417: Geographic Information Systems for Natural and Social Sciences (3 units)

Description: Introduction to the application of GIS and related technologies for both the natural and social sciences. Conceptual issues in GIS database design and development, analysis, and display.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components: Laboratory Required
 Lecture Required

Equivalent to: GEOG 417, SW 417, SWES 417

Also offered as: GEOG 417, GIST 417

Co-convened with: RNR 517

Course typically offered:

Main Campus: Fall, Spring, Summer

Online Campus: Fall, Spring, Summer

Recommendations and additional information: Basic knowledge of computer operations.

RNR 418: Analysis of Geospatial Data (3 units)

Description: Introduction to spatial analysis and modeling techniques. Students will learn how to use calculate spatial measurement, apply spatial statistical methods, create surfaces, and develop spatial modeling. Assignments will allow students to apply the methods to various real world problems.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: GEOG 418, GIST 418

Course typically offered:

Main Campus: Fall

Online Campus: Fall

Enrollment requirement: RNR/GEOG/GIST 417, and Statistics (MATH 163, or MATH 263, or SBS 200, or PSY 230, or equivalent).

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 419: Cartographic Modeling for Natural Resources (3 units)

Description: Computer techniques for analyzing, modeling, and displaying geographic information. Development of spatially oriented problem design and the use of logic are applied to the use of GIS programs. Emphasis on applications in land resources management and planning.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: GEOG 419

Also offered as: GEOG 419

Co-convened with: RNR 519

Course typically offered:

Main Campus: Spring

RNR 420: Advanced Geographic Information Systems (3 units)

Description: Examines various areas of advanced GIS applications such as dynamic segmentation, surface modeling, spatial statistics, and network modeling. The use of high performance workstations will be emphasized.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory	Required
	Lecture	Required

Also offered as: GEOG 420, GIST 420

Co-convened with: RNR 520

Course typically offered:

Main Campus: Spring

Online Campus: Spring

Enrollment requirement: RNR/GEOG/GIST 417

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 422: Resource Mapping Using Unmanned Aircraft Systems (3 units)

Description: This course combines aspects of remote sensing, GIS, and biogeography in an interdisciplinary framework to elucidate how land use and land cover can be monitored using UAS. Links will be made with field and satellite-based monitoring techniques to cross-validate landscape maps. Students that take this course will develop a solid scientific and applied basis to address geospatial landscape monitoring questions. They will do this by safely flying a drone, acquiring data in the field and with the drone, processing GPS and multi-sensor data, analyzing these data and creating landscape maps and products.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: GEOG 422

Also offered as: GEOG 422

Co-convened with: RNR 522

Course typically offered:

Main Campus: Summer

Recommendations and additional information: RNR 417.

RNR 427: Earth's Changing Carbon Cycle (3 units)

Description: This class investigates the natural and human influences on the global carbon cycle. With a focus on natural ecosystems, students examine the key elements of the carbon cycle, the processes controlling them and environmental consequences of curbing rising atmospheric carbon.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
---------------------------	---------	----------

Co-convened with: RNR 527

Course typically offered:

Main Campus: Fall

Honors Course: Honors Contract

Honors Course: Honors Contract

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 429: Ecological Climatology (3 units)

Description: Life evolved on the Earth partly due to favorable climate conditions, but life has also played an important role in shaping the Earth's atmosphere and climate - a perfect example of the complex feedbacks occurring between biological and geophysical systems. This course will explore in-depth interactions occurring between relevant areas of ecology - the study of the interactions of organisms among themselves and with their environment - and climatology - the study of the physical state of the atmosphere - to understand the functioning of terrestrial landscapes in the climate system. A central focus will be on the exchange of energy, water, chemical elements, and trace gases between terrestrial ecosystems and the atmosphere and how this exchange leads to fascinating feedbacks in Earth's climate system. This course combines aspects of physical climatology, hydrology, ecosystem ecology, and biogeography in an interdisciplinary framework to elucidate how the biosphere and atmosphere are inextricably linked. Students that take this course will develop a solid conceptual framework for evaluating how the biosphere responds to climate perturbations and how, in turn, perturbations in the biosphere affect climate. This course will provide students with a critical thinking skill-set that will allow them to evaluate important topical issues regarding climate change. Students will also get an introduction to the vast freely downloadable climate, satellite, and Earth System Model data and an introduction to the technical skills needed to incorporate these data into their own scholarship and research.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components: Lecture Required

Co-convened with: RNR 529

Course typically offered:

Main Campus: Fall

Recommendations and additional information: A background course in ecology, hydrology, climatology, and/or biogeography is recommended but not required.

RNR 431A: Traditional Ecological Knowledge (3 units)

Description: An introduction to the growing literature on traditional ecological knowledge and its relationships to the ecological and social sciences.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: AIS 431A, ANTH 431A, ENVS 431A, GEOG 431A, RAM 431A, WFSC 431A, WSM 431A

Co-convened with: RNR 531A

Course typically offered:

Main Campus: Fall

Home department: American Indian Studies Committee

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 436: Agro-ecology (3 units)

Description: Agro-ecology is the application of ecological principles to the production of food and fiber. The underlying goals are to assess and promote the long-term sustainability of agricultural production systems. Through this course we will study how agro-ecosystems vary across time and space and will examine the trade-offs associated with different cropping systems and management practices. We will begin with a brief history of major trends in agriculture, then examine the ecological interactions involved in crop production, observe how these interactions shape agricultural practices and conclude with a discussion of domestic and international government policies that influence agricultural sustainability.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: ENTO 436, ENVS 436, PLS 436

Co-convened with: RNR 536

Course typically offered:

Main Campus: Spring

Recommendations and additional information: ECOL 302.

Home department: Entomology

RNR 438: Fire Ecology (2 units)

Description: RNR 438-538 provides students with an opportunity to develop a deeper and more advanced understanding of wildland fire as a physical, ecological, and societal process. Students will read current and classic literature, participate and lead discussions, and undertake special projects using computer models of fire behavior and effects. The course is open to both graduate and advanced undergraduate students.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Co-convened with: RNR 538

Course typically offered:

Main Campus: Fall (even years only)

Recommendations and additional information: RNR 316 or RAM 382; basic ecology course.

-SA represents a Student Abroad & Student Exchange offering

-**CC** represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 440: Climate Change Adaptation: Perspectives at the Nexus of Science, Society, & Resource Management (3 units)

Description: Much of modern society's experience of managing resources and protecting people and infrastructure has occurred during a period of relatively stable climate. In the most recent decades in the Southwest, we have observed a cascade of impacts associated with temperature increases, including changes in snow hydrology, in phenology, and in the severity of drought impacts. Projected future climate changes and impacts may lie outside the range of climate variation that we have observed and may have more serious consequences for society and the environment. Anticipating projected changes will allow society to identify response options across a range of vulnerabilities and manage the risks associated with projected climate changes. In the best possible cases, these actions or adaptations, may provide economic and other benefits to society. In this 3 credit course, we will examine actions to reduce vulnerabilities or increase resilience to the potential impacts of climate change. While the general focus will be on impacts and responses in the arid Southwest (water, fire, species, ecosystems), we will also investigate the philosophies and frameworks for advancing action and incorporation of adaptation planning at the regional, national and international scale.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Co-convened with: RNR 540

Course typically offered:

Main Campus: Fall

RNR 441A: Natural Resource Management in Native Communities (3 units)

Description: This course is a survey of basic issues and concepts in natural resource management and the environment in Native communities using integrated case studies that survey all the major varieties of environmental issues in Indian Country in the 21st century. A central theme will be developing tribally-specific solutions to rebuilding the resiliency of degraded ecosystems. We will consider particular case studies such as: tribal sovereignty, land tenure, reserved rights and Native claims; Native knowledge systems and Western science; co-management and restoration; water; fish and wildlife; agriculture and rangeland management; energy, mining and nuclear waste; and global climate change.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: ANTH 441A, ARL 441A, RAM 441A, RNR 441A, SWES 441A, WFSC 441A, WSM 441A

Also offered as: AIS 441A, ANTH 441A, ARL 441A, ENVS 441A, RAM 441A, WFSC 441A, WSM 441A

Co-convened with: RNR 541A

Course typically offered:

Main Campus: Fall, Spring

Home department: American Indian Studies Committee

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 448: Conservation Planning & Wildland Recreation (3 units)

Description: This course will introduce the concepts and techniques used in the growing field of human use management in outdoor recreation settings. The focus is on the sociological dimensions of the recreation experience and an understanding of the principles, practices, and dilemmas of outdoor recreation management in natural areas.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: LAR 448

Also offered as: LAR 448

Co-convened with: RNR 548

Course typically offered:

Main Campus: Fall, Spring

RNR 452: Dryland Ecohydrology and Vegetation Dynamics (4 units)

Description: Overview of ecological and hydrological interrelationships, including ecologically meaningful water budgets, and associated vegetation dynamics for water-limited, dryland ecosystems.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:

Also offered as: ECOL 452, HWRS 452, WSM 452

Co-convened with: RNR 552

Course typically offered:

Main Campus: Fall

Recommendations and additional information: RNR 316, ECOL 302, or consent of instructor.

Home department: Watershed Management

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 458: Ecosystem Ecology and a Sustainable Future (3 units)

Description: Rapid changes to Earth's biosphere will influence how natural and managed ecosystems function and alter the services they provide. Issues from conservation biology to sustainability and global climate change rely on a comprehensive understanding of ecosystem processes. In this class, students will learn the principles of terrestrial ecosystem ecology, examining the influence of biological, ecological, and physical processes on energy and material flows and water and elemental (carbon, nitrogen, phosphorous) cycling in ecosystems. Graduate level requirements include an additional project and leading class discussions.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Co-convened with: RNR 558

Course typically offered:

Main Campus: Spring

Enrollment requirement: RNR 316 or ECOL 302 or permission of instructor.

RNR 464: Sonoran Desert Discovery (3 units)

Description: In Sonoran Desert Discovery, enrolled students will teach biological, ecological, and ecosystem principles (Biosphere 1) to school groups and the public (kindergarten to retiree) at Biosphere 2 and other Tucson venues. Students will build inquiry-based workshops (on campus and in small groups) to lead for the public. Students will develop public-speaking skills and their own effective teaching style while learning about Sonoran desert ecology and natural history.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Repeatable: Course can be repeated a maximum of 4 times.

Also offered as: ECOL 464

Co-convened with: RNR 564

Recommendations and additional information: ECOL 182L and ECOL 182R or equivalent biology & ecology background. ECOL 302 and other ECOL courses recommended. Especially motivated students without biology/ecology background may also do well.

Field trip: Course includes several, usually Saturday, field trips.

Home department: Ecology & Evolutionary Biology

Honors Course: Honors Contract

Honors Course: Honors Contract

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 472: Environmental Land Use Planning (3 units)

Description: This course focuses on the complex linkages between human and natural systems. Environmental planning utilizes methodologies which are systematic, iterative, and transparent and relies on integrating a wide spectrum of contemporary environmental issues in order to achieve more sustainable land use outcomes. As an interdisciplinary course, it draws from the fields of planning, geography, design, land use law, public policy, economics, natural science, and engineering among others. This course aims to equip students with a broad knowledgebase which focuses on landscape components and processes. Further, students will develop the necessary land use analysis and management skills in order to help guide land use decision making, engage stakeholders, and minimize/mitigate conflict between natural and built systems in an effort to produce more sustainable land use patterns and plans.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
---------------------------	---------	----------

Equivalent to: PLG 472

Also offered as: PLG 472

Co-convened with: RNR 572

Course typically offered:

Main Campus: Fall, Spring

Home department: Planning

RNR 473: Spatial Analysis and Modeling (3 units)

Description: Explores the use of geographic information systems (GIS) as a tool for natural resource and environmental managers. Topics include spatial autocorrelation, interpolation techniques, and model integration. Examines sources of error and possible ramifications.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory Lecture	May Be Offered Required
---------------------------	-----------------------	----------------------------

Equivalent to: GEOG 473, HWRS 473, WSM 473

Also offered as: GEOG 473

Co-convened with: RNR 573

Course typically offered:

Main Campus: Fall

Recommendations and additional information: RNR 417; a statistics course.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 476: Environmental Law and Economics (3 units)

Description: A complex set of laws has developed to control the environmental risks posed by potentially polluting activities. In this course, a survey and an economic evaluation are presented of major environmental legislation designed to protect air, land and water resource quality.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: AEC 476, ECON 476, HWRS 476, RNR 476, WRA 476, WSM 476

Also offered as: AREC 476, HWRS 476

Course typically offered:

Main Campus: Spring

Home department: Agricultural & Resource Economics

Enrollment requirement: Major or minor: ABEM, EWRE. Junior or Senior status. (AREC 304 or ECON 300 or ECON 301 or ECON 361) and (MATH 113 or MATH 116 or MATH 122B or MATH 124 or MATH 125).

RNR 479: Economic Analysis of Water, Food & Environmental Policies (3 units)

Description: This course focuses on economic methods for designing and evaluating water, food and environmental policies. Topics include optimizing water as an input in producing food, energy, recreation, and other ecosystem services; water & environmental issues in food production; pricing and conservation incentives; managing shortage risks; and economic tools for addressing conflicts over water, food and the environment. Interactive seminar style course. Calculus proficiency is required.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: GEOG 479, HWRS 479, RNR 479, SWES 479

Also offered as: AREC 479, ENVS 479, HWRS 479

Course typically offered:

Main Campus: Spring

Recommendations and additional information: One semester of college calculus. One of the following courses: MATH 113, MATH 116, MATH 122B, MATH 125

Home department: Agricultural & Resource Economics

Enrollment requirement: Major in College of Engineering or major/minor in ABEM, ENVS, EWRE, HWRS, NTRS, or WSM. Junior or Senior status. MATH 113, MATH 116, MATH 122B, or MATH 125 (or AP credit for Calculus AB or BC).

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 480: Natural Resources Policy and Law (3 units)

Description: Resource policy formation; ethics of resource use; administration and organization for resource management; analysis of present policy and trends.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$23

Course Components: Lecture Required

Co-convened with: RNR 580

Course typically offered:

Main Campus: Spring

Recommendations and additional information: RNR 200.

RNR 481: Environmental Policy (3 units)

Description: Role of government in management of energy, natural resources and environment; process and policy alternatives; special attention to the Southwest.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: HWRS 481, POL 481, RNR 481, WRA 481

Also offered as: HWRS 481, PA 481, POL 481

Co-convened with: RNR 581

Course typically offered:

Main Campus: Fall

Recommendations and additional information: POL 201.

Home department: School of Government and Public Policy

RNR 482: Integrated Geospatial Technologies (3 units)

Description: The course will cover resource mapping concepts and technologies. Students are expected to have a background in GIS and remote sensing. Topics will include survey methods (e.g. GPS), Internet Mapping Technologies (e.g. Google Earth), remoting sensing technologies such as LiDAR and digital imagery, classification methods, and data integration. Students will be required to complete an independent mapping project.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: GEOG 482, GIST 482

Course typically offered:

Main Campus: Spring

Online Campus: Spring

Enrollment requirement: RNR 417, GEOG 330, and GEOG/GIST 315.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 483: Geographic Applications of Remote Sensing (3 units)

Description: Use of aircraft and satellite imagery for monitoring landforms, soils, vegetation and land use, with the focus on problems of land-use planning, resource management and related topics.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components: Lecture Required

Equivalent to: PLAN 483, PLN 483, PLNG 483, RNR 483, SWES 483

Also offered as: ENV5 483, GEOG 483, GIST 483, PLG 483

Co-convened with: RNR 583

Course typically offered:

Main Campus: Spring

Online Campus: Spring

Home department: School of Geography and Development

Enrollment requirement: GEOG/GEN/GEOS/ENV5/WSM/GIST 330.

Student Engagement Activity: Discovery

Student Engagement Competency: Interdisciplinarity

RNR 485: The Economics & Social Connections to Natural Resources (3 units)

Description: The economics and social connections to environmental systems and their problems offers an important insight into the use, misuse, and overuse of natural resources. This course examines economic theory, concepts, and decision-making tools for real-world problems and possible solutions. The course is intended for students studying natural resources, environmental science, social sciences, public policy, public administration, and other disciplines interested in this perspective. Descriptive, graphical, and elementary quantitative methods will be used throughout the course.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: PA 485

Co-convened with: RNR 585

Course typically offered:

Main Campus: Spring

Recommendations and additional information: MATH 110 or 112.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Remote Sensing for the Study of Planet Earth introduces basic and applied remote sensing science as a means to explore the diversity of our planetary environments (biosphere, atmosphere, lithosphere and hydrosphere) within the radiometric, spectral, spatial, angular and temporal domains of remote sensing systems. This survey course strikes a balance between theory, applications and hands-on labs and assignments. We explore how you can download, process, analyze and interpret multi-sensor data and integrate online remotely sensed data sources/products into your research of interest.

Main Campus: Fall

Enrollment requirement: GEOG/GEN/GEOS/ENVS/WSM/GIST 330.

Main Campus: Fall, Spring, Summer

Recommendations and additional information: Consent of instructor.

Main Campus: Fall, Spring, Summer

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 493: Internship (1 - 8 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 493L: Legislative Internship (1 - 12 units)

Description: Working experience at the Arizona State Legislature; responsibilities draw upon student's area of major expertise and include preparing written and oral reports, summarizing legislative proposals, and providing information to legislators and legislative committees.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 494: Practicum (1 - 8 units)

Description: The practical application, on an individual basis, of previously studied theory and the collection of data for future theoretical interpretation.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 495A: Communication Skills in Conservation (3 units)

Description: Communication and political skills are critical for natural resources professionals to be effective in their positions, no matter if they are laboratory researchers, field biologists or directors of government agencies. We will first discuss the importance of these skills in natural resource management. We will then examine effective techniques for interpersonal and group communication, negotiation, personnel management, project/time management, defense against "dirty politics" and methods to address job burnout as they relate to natural resources professionals. Students will learn techniques through lectures, outside speakers, class discussions, and case histories. During this course, we will also examine various points of view on important natural resources issues and how the above skills might be applied to work with various stakeholder groups.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Co-convened with:

Course typically offered:

Main Campus: Spring (odd years only)

RNR 495F: Conservation Biology: Field Studies in Developing Countries (3 - 6 units)

Description: Many of the world's biological "hot spots", as well as some of the most critically threatened ecosystems are in developing nations and are in the greatest need for biological research. In this course, students will be able to step out of the classroom and into the real world to experience first hand the critical role that field biologists play in conservation. Students will be introduced to novel ecosystems and exposed to conservation issues faced by developing nations. Students will use the local environment as a laboratory to learn field research techniques and methodology. For students interested in the biological sciences, conducting field research "in situ" is invaluable in their professional development. The opportunity to visit a foreign country and be exposed to a different culture and environment can be a life changing experience. The objective of this course is to provide that experience in the context of biological research and the development of conservation professionals.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Repeatable: Course can be repeated a maximum of 3 times.

Equivalent to: SWES 495F

Also offered as: ENVS 495F

Co-convened with: RNR 595F

Course typically offered:

Main Campus: Summer

Student Engagement Activity: Intercultural Exploration

Student Engagement Competency: Global and Intercultural

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 495G: Amazon Rainforest Conservation Biology in Ecuador (3 units)

Description: Located in the Amazon rainforest near the Equator, the Shiripuno River/Yasuni National Park region is considered to have the world's greatest biodiversity. After arriving in Quito, the capitol of Ecuador, we will travel to Puerto Francisco de Orellana, the gateway to the Amazon rainforest. From there we will travel by bus to the Shiripuno River (a tributary of the Amazon River) where Huaorani Guides will take us by boat to the Shiripuno Field Station. Along the way we will see several species of macaws, tapirs, monkeys, and turtles. The Shiripuno Field Station is maintained by the local Huaorani tribe and will function as our field station for the majority of the class. With comfortable accommodations and an extensive network of well-maintained trails in pristine rainforest, it is an ideal location to have a once-in-a-lifetime experience. We will conduct multiple tours of the area guided by Huaorani field experts to observe plants, birds, amphibians, reptiles, mammals, and many other unique features of this amazing area. Each student will be given the opportunity to develop and implement a unique research project. Research topics can include a biological inventory, soil analysis, working with Huaoranis to understand their perspectives of the environment, and investigate the conflict of oil development with the tremendous natural resources of the region in one of the last untouched rainforests on Earth.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Also offered as: ENVS 495G

Co-convened with: ENVS 595G

Course typically offered:

Main Campus: Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 495M: Conservation Realities in Northern Mexico (6 - 9 units)

Description: Conservation Realities in Northern Mexico is a trans-disciplinary field course that will immerse students in the frontier of social and environmental research and conservation issues in the multicultural U.S.-Mexico borderlands. The University of Arizona has a distinguished history of offering cross-border field courses, which this course continues. Learning will be based in Tucson at the historic Desert Laboratory on Tumamoc Hill, and in the field in Northern Mexico in the remarkable islands of the Gulf of California and mountains and canyons of the Alamos region in southern Sonora. The course will leverage partnerships both across campus and with communities in Mexico to provide transformative learning opportunities for advanced undergraduate and graduate students. Specifically, the class follows a social and environmental curriculum that addresses on the ground conservation, focusing on two distinct geographic and cultural case studies. The first module will be based in the Midriff Islands of the Gulf of California in partnership with the indigenous Comcaac and Prescott College Kino Bay Center. The second will be based in the tropical dry forest and campesino communities of Alamos, Sonora region, partnering with the Reserva Monte Mojino, a project of Nature and Culture International.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Co-convened with: RNR 595M

Course typically offered:

Main Campus: Summer

Recommendations and additional information: Spanish 101 or the equivalent.

Field trip: Spend your summer immersed in the some of the most beautiful locations of the Sonoran Desert. Visit and learn about the remarkable islands of the Gulf of California and mountains and canyons of the Alamos region in southern Sonora.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 495N: Community Based Conservation in Nepal (6 units)

Description: The concepts and principles of biodiversity conservation through protected area management are evolving all around the world. The core issue has been how the system reconciles the needs and aspirations of local communities with the conservation of biodiversity. Through this course a group of students will be exposed to the participatory mode of conservation in Nepal through experiential learning. Nepal has created an impressive array of protected areas that include viable samples of biodiversity found in the Himalayas. Nepal showcases how conservation with the active involvement of local communities can persist even during periods of national and social unrest and conflicts. Nepal has outstanding assemblages of plants, animals and ecosystems in a remarkable physical setting. The altitude increases dramatically from less than 100m above sea level in the subtropical Terai Region in the southern part of the country to Mount Everest, the highest point on the earth's surface (8848m), all within a short horizontal distance of about 200km. While students will experience the unique biodiversity of Nepal, the course also provides opportunities to learn about Nepal's diverse cultures, aspects of cultural anthropology, and conservation politics that shape conservation practices in a country.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Co-convened with: RNR 595N

RNR 496B: Natural Resources Seminar (1 - 3 units)

Description: The development and exchange of scholarly information, in a small group setting, on selected topics in natural resources conservation and management. Course registrants exchange results of research through discussions, reports, and/or papers.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Seminar Required

Repeatable: Course can be repeated a maximum of 6 times.

Co-convened with:

Course typically offered:

Main Campus: Fall, Spring

RNR 496D: Redesigning Food Systems for Sustainability, Security and Health (3 units)

Description: Understanding how regional food systems function to serve or not serve local people, economies and ecosystems in the Sonoran Borderlands.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: ENVS 496D, PLS 496D

Home department: Soil, Water, & Environmental Sciences

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 496E: Restoration Ecology (2 units)

Description: The Restoration Ecology seminar aims to provide students with a broad, balanced understanding of science and practice in the field of restoration ecology. This class is an introduction to the common issues, problems, strengths, and weaknesses of restoration activities across all regions, biomes, and intensities of management. A special emphasis is given to the application of restoration ecology in addressing emerging challenges in natural resource ecology and management.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Seminar Required

Co-convened with: RNR 596E

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Students enrolling in the course should have completed at least two (2) semesters of ecology and/or natural resources management.

RNR 496G: Climate Assessment: Explorations in Decision Support (3 units)

Description: Whatever your specialty, this course will provide you with strategic, timely, and comprehensive information on climate change impacts within regions and sectors of the U.S., prepare you to engage in environmental problem solving in the context of climate change, and introduce you to key individuals in the climate-related research community. The current U. S. National Climate Assessment is the main text for this course; the class will discuss and evaluate the environmental, social and physical impacts occurring and projected to occur in the U.S., and complete an original climate assessment report.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Seminar Required

Co-convened with:

Course typically offered:

Main Campus: Spring

RNR 497B: Desert Ecosystems (1 unit)

Description: The practical application of theoretical learning within a group setting and involving an exchange of ideas and practical methods, skills, and principles.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Workshop Required

Repeatable: Course can be repeated a maximum of 4 times.

Co-convened with: RNR 597B

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 497W: Costa Rica: Energy, Water and Health; a Service-Learning Course (6 units)

Description: This month-long course is located in the south of Costa Rica, in the Térraba Basin, one of the largest, most economically stressed and contentious basins in the country. This area depends on just a few industries and companies, including a subsidiary of Del Monte pineapple. Students will live, study, and work in two communities that are geographically close to each other: Volcán, where, since 1979, a large percentage of Del Monte's Costa Rica plantations are located; and Longo Mai, a rural farming community that aims to be sustainable and educate local people and visitors about how to live simply, authentically, with affection for the land.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Co-convened with: RNR 597W

Course typically offered:

Main Campus: Summer

Field trip: This is a study abroad course with a large component taking place in Costa Rica.

RNR 498: Senior Capstone (1 - 3 units)

Description: A culminating experience for majors involving a substantive project that demonstrates a synthesis of learning accumulated in the major, including broadly comprehensive knowledge of the discipline and its methodologies. Senior standing required.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 498H: Honors Thesis (3 units)

Description: An honors thesis is required of all the students graduating with honors. Students ordinarily sign up for this course as a two-semester sequence. The first semester the student performs research under the supervision of a faculty member; the second semester the student writes an honors thesis.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 9 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

Writing Emphasis: Writing Emphasis Course

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 499: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 499H: Honors Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

RNR 503: Applications of Geographic Information Systems (3 units)

Description: General survey of principles of geographic information systems (GIS); applications of GIS to issues such as land assessment and evaluation of wildlife habitat; problem-solving with GIS. Graduate-level requirements include completion of a project on the use of GIS in their discipline or an original GIS analysis (100 points) in coordination with the instructor.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory	Required
	Lecture	Required

Also offered as: GEOG 503

Co-convened with: RNR 403

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: Basic computer application skills required.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 504R: Biology of the Oceans (3 units)

Description: This course will provide a brief overview of oceanography only to set the stage for exploring the diversity and ecology of biological organisms in ocean systems, as well as how biological processes (including human activity) shape ocean physics, chemistry and geology. Graduate-level requirements include writing an NSF-style Graduate Student Research Fellowship targeted to the Biological Oceanography directorate on an instructor-approved topic of their choice.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
---------------------------	---------	----------

Equivalent to: ECOL 504A, GEOS 504A, GEOS 504R, RNR 504A, RNR 504R

Also offered as: ECOL 504R

Co-convened with:

Recommendations and additional information: ECOL 182R or GEOS 412A or consent of instructor.

Home department: Ecology & Evolutionary Biology

Interdisciplinary Interest Area: GEOS - Geosciences

RNR 506L: Conservation Biology in the Field (1 unit)

Description: Problem-solving, discussion, and field trips (binoculars recommended). One Saturday trip and two 3-day weekend trips in Oct-Nov. Graduate-level requirements include participation as team leaders.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$139

Course Components:	Laboratory	Required
---------------------------	------------	----------

Equivalent to: GEOS 506L, RNR 506L

Also offered as: ECOL 506L

Recommendations and additional information: Concurrent registration, ECOL 506R.

Field trip: One Saturday trip and two 3-day weekend trips in Oct-Nov.

Home department: Ecology & Evolutionary Biology

Interdisciplinary Interest Area: GEOS - Geosciences

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 506R: Conservation Biology (3 units)

Description: Biological principles applied to protection and recovery of threatened and endangered species and the processes which link species in natural ecosystems. Biological basis for conservation laws and regulations. Distribution, valuation and sustainable production of biodiversity benefits for humanity. Graduate-level requirements include a research paper.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ECOL 506, GEOS 506, GEOS 506R, RNR 506, RNR 506R

Also offered as: ECOL 506R

Co-convened with:

Course typically offered:

Main Campus: Spring

Home department: Ecology & Evolutionary Biology

Interdisciplinary Interest Area: GEOS - Geosciences

RNR 513: Applied Biostatistics (3 units)

Description: Introductory and advanced statistical methods and their applications in ecology. Focuses on how research design dictates choice of statistical models; explores principles and pitfalls of hypothesis testing.

Grading basis: Regular Grades

Career: Graduate

Course Components: Laboratory May Be Offered
Lecture Required

Equivalent to: EIS 613, ENTO 613, INSC 613

Also offered as: BE 513, EIS 513

Course typically offered:

Main Campus: Fall

Home department: Biosystems Engineering

RNR 514: Cost-Benefit Analysis (3 units)

Description: Theoretical bases and empirical techniques. Consumer-producer surplus; social and private costs; macroeconomic distortions; non-market goods; uses in policy analysis.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: AEC 514, ECON 514, MAP 514, RNR 514

Also offered as: AREC 514, ECON 514

Recommendations and additional information: ECON 361, MATH 113.

Home department: Agricultural & Resource Economics

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 516A: Computer Cartography (3 units)

Description: Introduces the principles of map design, production and analysis. Graduate-level requirements include an instructor approved 5-8 page paper on a related topic and analytical cartography demonstrating scholarly analysis in contemporary analytical cartography.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: GEOG 581, PLNG 581, RNR 516A

Also offered as: GEOG 516A

Co-convened with: RNR 416A

Course typically offered:

Main Campus: Fall, Spring

Home department: School of Geography and Development

RNR 516C: Urban Geographic Information Systems (3 units)

Description: Introduces concepts and application skills for use of geographic information systems to investigate a range of urban spatial issues and decision-making processes. Emphasis on complete process of GIS-based problem solving, including project planning, spatial data sources/acquisition, preparation/coding, analysis, representation, and communication. Graduate-level requirements include writing an original research papers based on original data collected in the field.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: PLG 516C, PLN 516C, RNR 516C

Also offered as: GEOG 516C, PLG 516C

Co-convened with: RNR 416C

Course typically offered:

Main Campus: Spring

Recommendations and additional information: GEOG 517 or RNR 517 or consent of instructor.

Home department: School of Geography and Development

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 516D: PPGIS: Participatory Approaches in Geographic Information Science (3 units)

Description: A project-based course focusing on applications and impacts of GIS and other spatial analysis technologies in grassroots community development, participatory decision making, and community-engaged social science. Class format includes discussion seminar, GIS workshop, collaboration, and out-of-classroom community involvement. Graduate-level requirements include writing an original research papers based on original data collected in the field.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components: Laboratory May Be Offered
 Lecture Required

Equivalent to: PLG 516D, PLN 516D

Also offered as: GEOG 516D, PLG 516D

Co-convened with: RNR 416D

Recommendations and additional information: GEOG 517 or RNR 517 or consent of instructor.

Home department: School of Geography and Development

RNR 516E: Geovisualization (GIS) (3 units)

Description: Introduces principles and practices of Geovisualization (Geoviz) and softwares (Community and ERDAS Image). Graduate-level requirements include an instructor-approved, scholarly paper on a related topic in Geoviz. The paper will be 5-8 double-spaced, typewritten pages and provide a scholarly analysis and critique of a significant real-world Geoviz application.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components: Laboratory May Be Offered
 Lecture Required

Also offered as: GEOG 516E, PLG 516E

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: GEOG 516A, GEOG/RNR 517 or consent of instructor.

Home department: School of Geography and Development

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 516F: GIS for the Social Sciences (3 units)

Description: An advanced course for students who want to integrate social science data and geographic information science into their research or work life. The course is presented in a lecture/laboratory format. The lecture portion will deal with conceptual issues necessary for the integration of social science data and approaches within a GIS framework. The laboratory portion will provide practical experience with GIS software products used for the development and analysis of spatially-referenced social science data sets. Graduate-level requirements include a 15 page term paper dealing with the integration of social science and GIS. Specific topics must be agreed upon in advance with the instructor. The paper will be completed in stages and due dates for selecting a topic, and for the completion of a précis, an outline and the paper will be posted on the course D2L site.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory	Required
	Lecture	Required

Also offered as: GEOG 516F

Co-convened with: RNR 416F

Course typically offered:

Main Campus: Fall

Recommendations and additional information: RNR 417.

Home department: School of Geography and Development

RNR 517: Geographic Information Systems for Natural and Social Sciences (3 units)

Description: Introduction to the application of GIS and related technologies for both the natural and social sciences. Conceptual issues in GIS database design and development, analysis, and display. Graduate-level requirements include a thorough bibliographic review and a scholarly paper on a current application of geographic information systems in the student's major field.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory	Required
	Lecture	Required

Equivalent to: GEOG 517, SW 517, SWES 517

Also offered as: GEOG 517

Co-convened with: RNR 417

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: Basic knowledge of computer operations.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 519: Cartographic Modeling for Natural Resources (3 units)

Description: Computer techniques for analyzing, modeling, and displaying geographic information. Development of spatially oriented problem design and the use of logic are applied to the use of GIS programs. Emphasis on applications in land resources management and planning. Graduate-level requirements include a research paper.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: GEOG 519

Also offered as: GEOG 519

Co-convened with: RNR 419

Course typically offered:

Main Campus: Spring

RNR 520: Advanced Geographic Information Systems (3 units)

Description: Examines various areas of advanced GIS applications such as dynamic segmentation, surface modeling, spatial statistics, and network modeling. The use of high performance workstations will be emphasized. Graduate-level requirements include a more extensive project and report.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory	Required
	Lecture	Required

Equivalent to: GEOG 520, RNR 518

Also offered as: GEOG 520

Co-convened with: RNR 420

Course typically offered:

Main Campus: Spring

Recommendations and additional information: RNR 517.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 522: Resource Mapping Using Unmanned Aircraft Systems (3 units)

Description: This course combines aspects of remote sensing, GIS, and biogeography in an interdisciplinary framework to elucidate how land use and land cover can be monitored using UAS. Links will be made with field and satellite-based monitoring techniques to cross-validate landscape maps. Students that take this course will develop a solid scientific and applied basis to address geospatial landscape monitoring questions. They will do this by safely flying a drone, acquiring data in the field and with the drone, processing GPS and multi-sensor data, analyzing these data and creating landscape maps and products.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: GEOG 522

Also offered as: GEOG 522

Co-convened with: RNR 422

Course typically offered:

Main Campus: Summer

RNR 526A: Principles of Indigenous Economics (3 units)

Description: Indigenous and aboriginal peoples in the Americas developed distinctive economic systems prior to contact with Europe. As the world economic system developed, indigenous peoples attempted to preserve their ways of life as best they could, with some success. This course examines the ontological, epistemological and moral principles of indigenous economic theory with application to contemporary problems.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
---------------------------	---------	----------

Also offered as: AIS 526A, ANTH 526A, PA 526A

Course typically offered:

Main Campus: Fall, Spring

Home department: American Indian Studies Committee

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 527: Earth's Changing Carbon Cycle (3 units)

Description: This class investigates the natural and human influences on the global carbon cycle. With a focus on natural ecosystems, students examine the key elements of the carbon cycle, the processes controlling them and environmental consequences of curbing rising atmospheric carbon. Graduate-level requirements include selecting a personal study topic relevant to their research interests, 5-10 minute presentation on their essay topic, complete several reading assignment and an associated short activity to be completed online.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
---------------------------	---------	----------

Co-convened with: RNR 427

Course typically offered:

Main Campus: Fall

RNR 529: Ecological Climatology (3 units)

Description: Life evolved on the Earth partly due to favorable climate conditions, but life has also played an important role in shaping the Earth's atmosphere and climate - a perfect example of the complex feedbacks occurring between biological and geophysical systems. This course will explore in-depth interactions occurring between relevant areas of ecology - the study of the interactions of organisms among themselves and with their environment - and climatology - the study of the physical state of the atmosphere - to understand the functioning of terrestrial landscapes in the climate system. A central focus will be on the exchange of energy, water, chemical elements, and trace gases between terrestrial ecosystems and the atmosphere and how this exchange leads to fascinating feedbacks in Earth's climate system. This course combines aspects of physical climatology, hydrology, ecosystem ecology, and biogeography in an interdisciplinary framework to elucidate how the biosphere and atmosphere are inextricably linked. Students that take this course will develop a solid conceptual framework for evaluating how the biosphere responds to climate perturbations and how, in turn, perturbations in the biosphere affect climate. This course will provide students with a critical thinking skill-set that will allow them to evaluate important topical issues regarding climate change. Students will also get an introduction to the vast freely downloadable climate, satellite, and Earth System Model data and an introduction to the technical skills needed to incorporate these data into their own scholarship and research. Graduate student requirements include 1) developing an analysis, writing it up in the format of a scientific paper, and presenting the analysis and paper to the class at the end of the semester, 2) selecting and formally reviewing two scientific papers from the peer-reviewed literature.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Lecture	Required
---------------------------	---------	----------

Co-convened with: RNR 429

Course typically offered:

Main Campus: Fall

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 531A: Traditional Ecological Knowledge (3 units)

Description: An introduction to the growing literature on traditional ecological knowledge and its relationships to the ecological and social sciences. Graduate-level requirements include preparing for and leading a class discussion on a specific topic.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
---------------------------	---------	----------

Also offered as: AIS 531A, ANTH 531A, ENVS 531A, GEOG 531A, RAM 531A, WFSC 531A, WSM 531A

Co-convened with: RNR 431A

Course typically offered:

Main Campus: Fall

Home department: American Indian Studies Committee

RNR 536: Agro-ecology (3 units)

Description: Agro-ecology is the application of ecological principles to the production of food and fiber. The underlying goals are to assess and promote the long-term sustainability of agricultural production systems. Through this course we will study how agro-ecosystems vary across time and space and will examine the trade-offs associated with different cropping systems and management practices. We will begin with a brief history of major trends in agriculture, then examine the ecological interactions involved in crop production, observe how these interactions shape agricultural practices and conclude with a discussion of domestic and international government policies that influence agricultural sustainability. Graduate-level requirements include leading one class discussion and taking a more in-depth take-home midterm exam.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: EIS 536, ENVS 536, PLS 536

Co-convened with: RNR 436

Course typically offered:

Main Campus: Spring

Home department: Committee on Entomology and Insect Science

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 538: Fire Ecology (2 units)

Description: RNR 438-538 provides students with an opportunity to develop a deeper and more advanced understanding of wildland fire as a physical, ecological, and societal process. Students will read current and classic literature, participate and lead discussions, and undertake special projects using computer models of fire behavior and effects. The course is open to both graduate and advanced undergraduate students. Graduate level requirements include co-leading two class sessions and writing a technical summary of a course topic.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
---------------------------	---------	----------

Co-convened with: RNR 438

Course typically offered:

Main Campus: Fall

RNR 540: Climate Change Adaptation: Perspectives at the Nexus of Science, Society, & Resource Management (3 units)

Description: Much of modern society's experience of managing resources and protecting people and infrastructure has occurred during a period of relatively stable climate. In the most recent decades in the Southwest, we have observed a cascade of impacts associated with temperature increases, including changes in snow hydrology, in phenology, and in the severity of drought impacts. Projected future climate changes and impacts may lie outside the range of climate variation that we have observed and may have more serious consequences for society and the environment. Anticipating projected changes will allow society to identify response options across a range of vulnerabilities and manage the risks associated with projected climate changes. In the best possible cases, these actions or adaptations, may provide economic and other benefits to society. In this 3 credit course, we will examine actions to reduce vulnerabilities or increase resilience to the potential impacts of climate change. While the general focus will be on impacts and responses in the arid Southwest (water, fire, species, ecosystems), we will also investigate the philosophies and frameworks for advancing action and incorporation of adaptation planning at the regional, national and international scale. Graduate-level requirements include completing a more in-depth project or research paper based on the course internship. The writing assignment will be identified by agency partners and approved by the instructors, and will address a subject of direct relevance to the organization's program.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Co-convener with: RNR 440

Course typically offered:

Main Campus: Fall

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: This course is a survey of basic issues and concepts in natural resource management and the environment in Native communities using integrated case studies that survey all the major varieties of environmental issues in Indian Country in the 21st century. A central theme will be developing tribally-specific solutions to rebuilding the resiliency of degraded ecosystems. We will consider particular case studies such as: tribal sovereignty, land tenure, reserved rights and Native claims; Native knowledge systems and Western science; co-management and restoration; water; fish and wildlife; agriculture and rangeland management; energy, mining and nuclear waste; and global climate change. Graduate-level requirements include Increased length of writing assignments.

Career: Graduate

Equivalent to: ARL 541A, RAM 541A, RNR 541A, SWES 541A, WFSC 541A, WSM 541A

Co-convened with: RNR 441A

Course typically offered:

Main Campus: Fall, Spring

Home department: American Indian Studies Committee

Description: Philosophy of science and the principles of conducting research, including formulation of problems, problem analysis, study plans, and preparation of manuscripts for publication.

Career: Graduate

Course typically offered:

Main Campus: Fall

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: This course will introduce the concepts and techniques used in the growing field of human use management in outdoor recreation settings. The focus is on the sociological dimensions of the recreation experience and an understanding of the principles, practices, and dilemmas of outdoor recreation management in natural areas. Graduate-level requirements include students to be team leaders during the project phase of the class. They will be expected to learn how to be project coordinators and work with undergraduate students.

Main Campus: Fall

Main Campus: Fall

Home department: Watershed Management

Main Campus: Spring

Recommendations and additional information: Familiar with differential calculus.

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Rapid changes to Earth's biosphere will influence how natural and managed ecosystems function and alter the services they provide. Issues from conservation biology to sustainability and global climate change rely on a comprehensive understanding of ecosystem processes. In this class, students will learn the principles of terrestrial ecosystem ecology, examining the influence of biological, ecological, and physical processes on energy and material flows and water and elemental (carbon, nitrogen, phosphorous) cycling in ecosystems. Graduate level requirements include an additional project and leading class discussions.

Main Campus: Spring

Home department: Ecology & Evolutionary Biology

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 572: Environmental Land Use Planning (3 units)

Description: This course focuses on the complex linkages between human and natural systems. Environmental planning utilizes methodologies which are systematic, iterative, and transparent and relies on integrating a wide spectrum of contemporary environmental issues in order to achieve more sustainable land use outcomes. As an interdisciplinary course, it draws from the fields of planning, geography, design, land use law, public policy, economics, natural science, and engineering among others. This course aims to equip students with a broad knowledgebase which focuses on landscape components and processes. Further, students will develop the necessary land use analysis and management skills in order to help guide land use decision making, engage stakeholders, and minimize/mitigate conflict between natural and built systems in an effort to produce more sustainable land use patterns and plans. Graduate-level requirements include five additional hands-on exercises designed to help graduate students develop skills suitable for professional practice in the field and writing a two page synopsis and critical review of a coastal zone management program.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: PLG 572

Also offered as: PLG 572

Co-convened with: RNR 472

Course typically offered:

Main Campus: Fall, Spring

Home department: Planning

RNR 573: Spatial Analysis and Modeling (3 units)

Description: Explores the use of geographic information systems (GIS) as a tool for natural resource and environmental managers. Topics include spatial autocorrelation, interpolation techniques, and model integration. Examines sources of error and possible ramifications. Graduate-level requirements include the students to show additional, sophisticated proficiency with the material through the completion of a final course project, consisting of an additional analysis of data provided by the students (see syllabus for point breakdown).

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory Lecture	May Be Offered Required
---------------------------	-----------------------	----------------------------

Equivalent to: GEOG 573, HWRS 573, WSM 573

Also offered as: GEOG 573

Co-convened with: RNR 473

Course typically offered:

Main Campus: Fall

Recommendations and additional information: RNR 517; a statistics course.

-SA represents a Student Abroad & Student Exchange offering

-**CC** represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 575: Economics of Water and Environmental Markets and Incentive-based Policies
(3 units)

Description: Economic incentives, tradable permits and markets for ecosystem services are pivotal in contemporary water and environmental policy. This class covers theory and application of economic concepts needed to evaluate water and environmental laws and policies; including ecosystem service provision, tradable use permits, benefit cost analysis, externalities, public goods and valuation methodologies. Case studies include federal, state, tribal and international water and environmental policies.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ARL 575, ECON 575, GEOG 575, HWRS 575, RNR 575

Also offered as: AREC 575, ARL 575, ECON 575, GEOG 575, HWRS 575

Course typically offered:

Main Campus: Fall

Recommendations and additional information: ECON 300 or ECON 361.

Home department: Agricultural & Resource Economics

RNR 576: Natural Resource Law and Economics (3 units)

Description: Advanced economic and legal analysis of environmental and natural resource policies.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ECON 576, HWRS 576, RNR 576

Also offered as: AREC 576, ECON 576, ENVS 576, HWRS 576, LAW 576

Course typically offered:

Main Campus: Spring

Recommendations and additional information: ECON 361 recommended but not required. Must have graduate standing to enroll.

Home department: Agricultural & Resource Economics

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 578: Global Change (3 units)

Description: Analysis of the Earth system through an examination of its component parts (particularly climate and biogeochemistry) and their interactions with human activities, emphasizing information needed to understand modern and future environmental changes. Graduate-level requirements include an in-depth written exercise and additional activities as described in the syllabus.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ECOL 578, GC 578, GEOG 578, HWRS 578, HYDR 578, RNR 578, SW 578

Also offered as: ECOL 578, GC 578, GEOG 578, GEOS 578, HWRS 578

Course typically offered:

Main Campus: Fall

Home department: Geosciences

Interdisciplinary Interest Area: ECOL - Ecology & Evolution Bio

RNR 580: Natural Resources Policy and Law (3 units)

Description: Resource policy formation; ethics of resource use; administration and organization for resource management; analysis of present policy and trends. Graduate-level requirements include an in-depth policy analysis paper.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$23

Course Components: Lecture Required

Co-convened with: RNR 480

Course typically offered:

Main Campus: Spring

RNR 581: Environmental Policy (3 units)

Description: Role of government in management of energy, natural resources and environment; process and policy alternatives; special attention to the Southwest. Graduate-level requirements include additional readings and a substantial research paper of at least 25 pages in length.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: HWRS 581, POL 581, RNR 581, WRA 581

Also offered as: HWRS 581, PA 581, POL 581

Co-convened with:

Course typically offered:

Main Campus: Fall

Home department: School of Government and Public Policy

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: This course focuses on how to manage collaboration in highly controversial environmental and natural resource conflicts. The course will draw on cases from texts and articles as well as focus on several disputes that have occurred or are ongoing in the American Southwest. The primary goal is to help participants become better consumers and producers of collaborative processes and tools and to encourage thoughtful critique, analysis and evaluation.

Main Campus: Spring

Online Campus: Spring

Home department: School of Geography and Development

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: The economics and social connections to environmental systems and their problems offers an important insight into the use, misuse, and overuse of natural resources. This course examines economic theory, concepts, and decision-making tools for real-world problems and possible solutions. The course is intended for students studying natural resources, environmental science, social sciences, public policy, public administration, and other disciplines interested in this perspective. Descriptive, graphical, and elementary quantitative methods will be used throughout the course.

Recommendations and additional information: MATH 110 or 112.

Home department: GIDP on Remote Sensing and Spatial Analysis

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 593: Internship (2 - 8 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 593L: Legislative Internship (1 - 9 units)

Description: Working experience at the Arizona State Legislature; responsibilities draw upon student's area of major expertise and include preparing written and oral reports, summarizing legislative proposals, and providing information to legislators and legislative committees.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 594: Practicum (1 - 8 units)

Description: The practical application, on an individual basis, of previously studied theory and the collection of data for future theoretical interpretation.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 595A: Communication Skills in Conservation (3 units)

Description: Communication and political skills are critical for natural resources professionals to be effective in their positions, no matter if they are laboratory researchers, field biologists or directors of government agencies. We will first discuss the importance of these skills in natural resource management. We will then examine effective techniques for interpersonal and group communication, negotiation, personnel management, project/time management, defense against "dirty politics" and methods to address job burnout as they relate to natural resources professionals. Students will learn techniques through lectures, outside speakers, class discussions, and case histories. During this course, we will also examine various points of view on important natural resources issues and how the above skills might be applied to work with various stakeholder groups.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Co-convened with: RNR 495A

Course typically offered:

Main Campus: Spring (odd years only)

RNR 595C: Human Dimensions in Renewable Natural Resources (3 units)

Description: [Taught even-numbered years] The exchange of scholarly information and/or secondary research, usually in a small group setting. Instruction often includes lectures by several different persons. Research projects may or may not be required of course registrants.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$42

Course Components: Colloquium Required

Repeatable: Course can be repeated a maximum of 2 times.

Course typically offered:

Main Campus: Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 595F: Conservation Biology: Field Studies in Developing Countries (3 - 6 units)

Description: Many of the world's biological "hot spots", as well as some of the most critically threatened ecosystems are in developing nations and are in the greatest need for biological research. In this course, students will be able to step out of the classroom and into the real world to experience first hand the critical role that field biologists play in conservation. Students will be introduced to novel ecosystems and exposed to conservation issues faced by developing nations. Students will use the local environment as a laboratory to learn field research techniques and methodology. For students interested in the biological sciences, conducting field research "in situ" is invaluable in their professional development. The opportunity to visit a foreign country and be exposed to a different culture and environment can be a life-changing experience. The objective of this course is to provide that experience in the context of biological research and the development of conservation professionals. Graduate-level requirements include developing an individual field project including a separate paper (in scientific format) to be submitted with the final deliverables.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated a maximum of 3 times.

Equivalent to: SWES 595F

Also offered as: ENVS 595F

Co-convened with: RNR 495F

Course typically offered:

Main Campus: Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 595G: Amazon Rainforest Conservation Biology in Ecuador (3 units)

Description: Located in the Amazon rainforest near the Equator, the Shiripuno River/Yasuni National Park region is considered to have the world's greatest biodiversity. After arriving in Quito, the capitol of Ecuador, we will travel to Puerto Francisco de Orellana, the gateway to the Amazon rainforest. From there we will travel by bus to the Shiripuno River (a tributary of the Amazon River) where Huaorani Guides will take us by boat to the Shiripuno Field Station. Along the way we will see several species of macaws, tapirs, monkeys, and turtles. The Shiripuno Field Station is maintained by the local Huaorani tribe and will function as our field station for the majority of the class. With comfortable accommodations and an extensive network of well-maintained trails in pristine rainforest, it is an ideal location to have a once-in-a-lifetime experience. We will conduct multiple tours of the area guided by Huaorani field experts to observe plants, birds, amphibians, reptiles, mammals, and many other unique features of this amazing area. Each student will be given the opportunity to develop and implement a unique research project. Research topics can include a biological inventory, soil analysis, working with Huaoranis to understand their perspectives of the environment, and investigate the conflict of oil development with the tremendous natural resources of the region in one of the last untouched rainforests on Earth. Graduate level requirements will be the same as for the undergraduate level.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Also offered as: ENVS 595G

Co-convened with: ENVS 495G

Course typically offered:

Main Campus: Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 595M: Conservation Realities in Northern Mexico (6 - 9 units)

Description: Conservation Realities in Northern Mexico is a trans-disciplinary field course that will immerse students in the frontier of social and environmental research and conservation issues in the multicultural U.S.-Mexico borderlands. The University of Arizona has a distinguished history of offering cross-border field courses, which this course continues. Learning will be based in Tucson at the historic Desert Laboratory on Tumamoc Hill, and in the field in Northern Mexico in the remarkable islands of the Gulf of California and mountains and canyons of the Alamos region in southern Sonora. The course will leverage partnerships both across campus and with communities in Mexico to provide transformative learning opportunities for advanced undergraduate and graduate students. Specifically, the class follows a social and environmental curriculum that addresses on the ground conservation, focusing on two distinct geographic and cultural case studies. The first module will be based in the Midriff Islands of the Gulf of California in partnership with the indigenous Comcaac and Prescott College Kino Bay Center. The second will be based in the tropical dry forest and campesino communities of Alamos, Sonora region, partnering with the Reserva Monte Mojino, a project of Nature and Culture International.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Co-convened with: RNR 495M

Course typically offered:

Main Campus: Summer

Recommendations and additional information: Spanish 101 or the equivalent.

Field trip: Spend your summer immersed in the some of the most beautiful locations of the Sonoran Desert. Visit and learn about the remarkable islands of the Gulf of California and mountains and canyons of the Alamos region in southern Sonora.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 595N: Community Based Conservation in Nepal (6 units)

Description: The concepts and principles of biodiversity conservation through protected area management are evolving all around the world. The core issue has been how the system reconciles the needs and aspirations of local communities with the conservation of biodiversity. Through this course a group of students will be exposed to the participatory mode of conservation in Nepal through experiential learning. Nepal has created an impressive array of protected areas that include viable samples of biodiversity found in the Himalayas. Nepal showcases how conservation with the active involvement of local communities can persist even during periods of national and social unrest and conflicts. Nepal has outstanding assemblages of plants, animals and ecosystems in a remarkable physical setting. The altitude increases dramatically from less than 100m above sea level in the subtropical Terai Region in the southern part of the country to Mount Everest, the highest point on the earth's surface (8848m), all within a short horizontal distance of about 200km. While students will experience the unique biodiversity of Nepal, the course also provides opportunities to learn about Nepal's diverse cultures, aspects of cultural anthropology, and conservation politics that shape conservation practices in a country. Graduate students will have additional requirement of preparing a final paper in the style of a literature review in the format for publication in a scientific journal as agreed upon by instructors.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Co-convened with: RNR 495N

RNR 596B: Natural Resources Seminar (1 - 3 units)

Description: The development and exchange of scholarly information, in a small group setting, on selected topics in natural resources conservation and management. Course registrants exchange results of research through discussions, reports, and/or papers.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Repeatable: Course can be repeated a maximum of 6 times.

Co-convened with: RNR 496B

Course typically offered:

Main Campus: Fall, Spring

Field trip: NA

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 596E: Restoration Ecology (2 units)

Description: The Restoration Ecology Seminar aims to provide students with a broad, balanced understanding of science and practice in the field of restoration ecology. This class is an introduction to the common issues, problems, strengths, and weaknesses of restoration activities across all regions, biomes, and intensities of management. A special emphasis is given to the application of restoration ecology in addressing emerging challenges in natural resource ecology and management. Graduate-level requirements include co-leading at least two class sessions.

Grading basis: Regular Grades

Career: Graduate

Course Components: Seminar Required

Co-convened with: RNR 496E

Course typically offered:

Main Campus: Fall (odd years only)

Recommendations and additional information: Students enrolling in the course should have completed at least two (2) semesters of ecology and/or natural resources management.

RNR 596G: Climate Assessment: Explorations in Decision Support (3 units)

Description: Whatever your specialty, this course will provide you with strategic, timely, and comprehensive information on climate change impacts within regions and sectors of the U.S., prepare you to engage in environmental problem solving in the context of climate change, and introduce you to key individuals in the climate-related research community. The current U. S. National Climate Assessment is the main text for this course; the class will discuss and evaluate the environmental, social and physical impacts occurring and projected to occur in the U.S., and complete an original climate assessment report. In the associated Practicum, graduate students will be mentored in actually conducting a next-generation assessment to be submitted as a technical input document for consideration by the authors of the fourth National Climate Assessment. Graduate level requirements include developing a proposal to conduct an impact or vulnerability assessment or research project for a specific region, sector or issue and presenting the proposal in class. Practicum participants will actually conduct an assessment to be submitted to the 4th National Climate Assessment as a technical input document.

Grading basis: Regular Grades

Career: Graduate

Course Components: Practicum Seminar May Be Offered Required

Co-convened with: RNR 496G

Course typically offered:

Main Campus: Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 596L: Leadership and Communication for Environmental Scientists (1 unit)

Description: As a graduate student in some area of environmental science, much of your graduate education will focus on developing expertise in your particular area of interest, as well as developing enough knowledge to bridge to other related areas of environmental science. But your ability to be effective and make major contributions over the course of your career will also depend greatly on your personal vision of where you are headed and the leadership and communication skills needed to get there. These skills are as important as any technical expertise you may be acquiring but few classes specifically focus on developing them. In this course, we will discuss concepts presented in "The Seven Habits of Highly Effective People", skills associated with effective professional communication using "Escape from the Ivory Tower", and examples of environmental scientists that seem to be very effective.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Course typically offered:

Main Campus: Fall

RNR 596U: Molecular Phylogenetics (2 units)

Description: This course will cover (1) the theoretical and methodological aspects of inferring phylogeny from molecular data, and (2) the use of phylogenetic trees for investigating a wide variety of biological questions, with readings from the primary literature forming the basis of discussions.

Grading basis: Regular Grades

Career: Graduate

Course Components: Seminar Required

Equivalent to: EIS 596U, ENTO 596U, PLS 596U, RNR 596U

Also offered as: ECOL 596U, EIS 596U, PLS 596U

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Graduate standing or consent of instructor.

Home department: Ecology & Evolutionary Biology

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 597W: Costa Rica: Energy, Water and Health; a Service-Learning Course (6 units)

Description: This month-long course is located in the south of Costa Rica, in the Térraba Basin, one of the largest, most economically stressed and contentious basins in the country. This area depends on just a few industries and companies, including a subsidiary of Del Monte pineapple. Students will live, study, and work in two communities that are geographically close to each other: Volcán, where, since 1979, a large percentage of Del Monte's Costa Rica plantations are located; and Longo Mai, a rural farming community that aims to be sustainable and educate local people and visitors about how to live simply, authentically, with affection for the land. Graduate students will be required to prepare a report, presentation, or work of art in an area outside their expertise/comfort zone based on several interviews with water leaders and town elders involved with the internship.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Co-convened with: RNR 497W

Course typically offered:

Main Campus: Summer

Field trip: This is a study abroad course with a large component taking place in Costa Rica.

RNR 599: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 615: Ecosystem Service Valuation Methods (3 units)

Description: This course examines theory, concepts, and the application of methods that are frequently used for the valuation of market and non-market ecosystem services. Understanding and predicting the behavior of decision makers and consumers, when choosing among institutional structures or incentives, is key to solving conflicts between humans and nature. Special focus is given to the concepts of utility, preferences, and willingness-to-pay (accept). Course intended for students studying natural resources, environmental science, public policy, public administration, and other disciplines interested in this perspective.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall

Recommendations and additional information: A background in Natural Resources, Ecology, and introductory courses in Calculus and Economics is highly recommended. Contact instructor if you have any questions.

Field trip: NA

RNR 620: Working with Ecological Data in R (2 units)

Description: R is increasingly becoming the software package of choice for manipulating, analyzing, and presenting data in ecological studies. This 2-credit graduate course will focus on fundamentals of the R language and introduce students to particular packages that are useful across a broad set of ecological applications. This course will emphasize tools for inputting, editing, checking, restructuring, and plotting of various data types (time series, counts, geographic layers, model output). This course will also include some discussion of general statistical approaches (hypothesis testing, parameter estimation and model selection) and their proper execution in R.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components: Lecture Required

Course typically offered:

Main Campus: Spring

RNR 693: Internship (2 - 8 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 694: Practicum (1 - 8 units)

Description: The practical application, on an individual basis, of previously studied theory and the collection of data for future theoretical interpretation.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 694A: Teaching in Renewable Natural Resources Studies (1 - 3 units)

Description: Mentored teaching experience for students serving as a teaching assistant in courses in Natural Resources.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 4 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 694B: Teaching in Range Management (1 - 3 units)

Description: Mentored teaching experience for students serving as a teaching assistant in courses in the Rangeland Ecology and Management program.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 4 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 694C: Teaching in Watershed Management (1 - 3 units)

Description: Mentored teaching experience for students serving as a teaching assistant in courses in the Watershed Management and Ecohydrology program.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 4 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 694D: Teaching in Wildlife and Fisheries Science (1 - 3 units)

Description: Mentored teaching experience for students serving as a teaching assistant in courses in the Wildlife and Fisheries Conservation and Management programs.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 4 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 696A: Renewable Natural Resources (1 - 2 units)

Description: The development and exchange of scholarly information, in a small group setting, on selected topics in Natural Resources science and management. Course registrants exchange results of research through discussions, reports, and/or papers.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Repeatable: Course can be repeated for a maximum of 4 units.

Course typically offered:

Main Campus: Fall, Spring

RNR 696C: Topics in Mine Environment Management (1 - 2 units)

Description: Topics in state of the art and practice for mine reclamation and environmental management of mine sites will be discussed from current literature. Students will gain an understanding of mining operations and the environmental impacts of the mine that need to be managed. Students will integrate readings in soil science, geology, hydrology, chemistry, biology, and engineering to formulate research topics.

Grading basis: Regular Grades

Career: Graduate

Course Components: Seminar Required

Also offered as: CHEE 696C, ENVS 696C, MNE 696C

Course typically offered:

Main Campus: Fall, Spring

Online Campus: Fall, Spring

Home department: Mining & Geological Engineering

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 696Q: Practical and Applied Hydrometeorology (1 - 3 units)

Description: This course is driven by the initiative and interest of the course members, on the basis of group decisions. Student-led discussion will be followed by a practical activity related to site development and site documentation. Field activity at the Biosphere 2 Research Facility (transportation provided) is built into the schedule as appropriate. The research goal is to document and investigate controls of vegetation on water, carbon and energy cycling as measured using eddy covariance and other micrometeorological techniques.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components: Seminar Required

Equivalent to: HWRS 696Q, RNR 696Q

Also offered as: HWRS 696Q, WSM 696Q

Field trip: Field activity at the Biosphere 2 Research Facility.

Home department: Watershed Management

RNR 696W: Water, Society, and Policy Seminar (1 unit)

Description: This course is designed to introduce students to the various ways that water science, societal forces, and public policy intersect, and to familiarize students with the various units on campus addressing complex interdisciplinary water management questions.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Repeatable: Course can be repeated a maximum of 3 times.

Course typically offered:

Main Campus: Fall, Spring

RNR 699: Independent Study (1 - 3 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

RNR 900: Research (1 - 8 units)

Description: Individual research, not related to thesis or dissertation preparation, by graduate students.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 909: Master's Report (1 - 8 units)

Description: Individual study or special project or formal report thereof submitted in lieu of thesis for certain master's degrees.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 910: Thesis (1 - 8 units)

Description: Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing). Maximum total credit permitted varies with the major department.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

RNR 920: Dissertation (1 - 9 units)

Description: Research for the doctoral dissertation (whether library research, laboratory or field observation or research, artistic creation, or dissertation writing).

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.