

NATURAL RESOURCES (NR)

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NR Courses

NR 140. Careers in Natural Resources Management and Environmental Sciences. 1 unit

Term Typically Offered: F

Analysis and development of career goals in natural resources and environmental sciences. Acquainting students with potential career options and preparation of academic plans for the majors in the Natural Resources Management and Environmental Sciences Department. 1 activity.

NR 141. Introduction to Forest Ecosystem Management. 3 units

Term Typically Offered: F

Sustainability Focused

Fundamentals of forestry including basic silviculture, forest protection, measurement and policy. Integrated resource management of forest lands for water production, forage, recreation, wildlife, and timber. 3 lectures.

NR 142. Environmental Management. 3 units

Term Typically Offered: F

Sustainability Focused

Recommended: NR 140.

Environmental management as a process within functioning societies seeking a harmonious balance between human activities and intrinsic behavior of the natural environment. Major components of the natural environment and the political and social activities that impact that environment. 3 lectures.

NR 200. Special Problems for Undergraduates. 1-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Credit/No Credit grading only. Total credit limited to 12 units. Formerly ERSC/SS 200.

NR 203. Resource Law Enforcement. 3 units

Term Typically Offered: W

Law enforcement applied to natural resource conservation on public and private lands. Examination of state and federal laws related to fish and wildlife management. Problems associated with implementation of resource laws examined. 3 lectures. Crosslisted as NR/RPTA 203.

NR 204. Wildland Fire Control. 3 units

Term Typically Offered: SP

Fire control techniques used on various wildland fuels. Elementary fire physics, fuels, weather, fire behavior, tactics and fire suppression techniques, line construction, "mop-up", fire line safety, air operations and fire organization. Meets basic wildland fire fighter certification requirements for the USDA Forest Service. Partially meets California Department of Forestry Firefighter I requirements. 2 lectures, 1 laboratory.

NR 208. Dendrology. 4 units

Term Typically Offered: F, W, SP

Recommended: BOT 121.

Identification, classification, silvical characteristics, distribution, environmental requirements and economic importance of woody plants in shrub, woodland, and forest ecosystems of the United States. Emphasis on species located in the Pacific Coastal, Sierran, and Cascade ecosystems. 2 lectures, 2 laboratories.

NR 215. Land and Resource Measurements. 1 unit

Term Typically Offered: F, W, SP

Introduction to land and resource measurement technology and methods - field instruments, property description, map and photograph reconciliation, data accuracy and precision. Trigonometric functions as applied to natural resources applications. Field trips required. 1 laboratory.

NR 218. Introduction to Geographic Information Systems (GIS). 3 units

Term Typically Offered: F, W, SP

Learn the fundamental concepts and functions of Geographic Information Systems (GIS) using ArcGIS platform. Create, manage, analyze, and display geographically referenced data. Explore how GIS is applied to analyze environmental, social, and natural resource issues. 1 lecture, 2 laboratories. Crosslisted as LA/NR 218.

NR 247. Forest Surveying. 2 units

Term Typically Offered: TBD

Prerequisite: NR 215.

Use and care of tapes, staff compass, abney levels, total stations, and GPS receivers. Keeping field notes, measurements by tape. Closed and open traverse by compass and total stations. Turning angles and determining directions of lines. Map reading and public land description. GPS measurements. Weekend field trips required. 1 lecture, 1 laboratory. Crosslisted as BRAE/NR 247.

NR 260. Forest Operations. 4 units

Term Typically Offered: SP

Recommended: NR 141 and NR 215.

Relationships between forest ecosystem management, forest practices, harvesting methods, timber harvest planning, components of forest harvesting, harvesting effects; cost analysis of harvesting methods; safety management; value-added forest utilization; environmental protection; and road location. Overnight or weekend field trips required. 3 lectures, 1 laboratory.

NR 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based or online format. 1 to 4 lectures.

NR 290. Intercollegiate Forestry Activities. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Prerequisite: Enrollment limited to those qualified to compete in intercollegiate forestry activities and consent of instructor.

Beginning through advanced skills in the event areas of college forestry activities. Instruction in use of specialized equipment and safety. Minimum of 4 hours of laboratory per week. Total credit limited to 18 units. Credit/No Credit grading only.

NR 304. Agroecology. 4 units

Term Typically Offered: SP
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and STAT 217 or STAT 218.

Ecological concepts and principles applied to the design and management of agricultural systems. Discussion of research in agroecology and assessment of cropping system sustainability. Laboratory section emphasizes field assessment of ecological structures and functions, experimental design and data interpretation. 3 lectures. 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 305. Forest Ecology and Silvics. 4 units

Term Typically Offered: F, W, SP
Sustainability Focused

Prerequisite: Completion of GE Area B2; and completion of GE Area B3 (GE Area B4 for students on the 2019-20 or earlier catalogs).

Examination of major forest types and the processes that determine their development and productivity across the earth (silvics). Integration of ecosystem ecology, plant physiology, and soil science to develop understanding of forest response to disturbance. Field trip required. 3 lectures, 1 laboratory.

NR 306. Natural Resource Ecology and Habitat Management. 4 units

Term Typically Offered: F
Sustainability Related

Prerequisite: Completion of GE Area B2; and completion of GE Area B3 (GE Area B4 for students on the 2019-20 or earlier catalogs).

Resource ecology and management implications in the major ecosystems of North America. Importance of maintaining the natural dynamics of energy flow and nutrient cycles at the community and ecosystem level to sustain uses and values. Humanity's role as a principal factor of change of the resources in natural systems. 3 lectures, 1 laboratory.

NR 307. Fire Ecology. 3 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area B2; and completion of GE Area B3 (GE Area B4 for students on the 2019-20 or earlier catalogs).

Effects of wildland fires on shrub, woodland, and forest environments to include fuels, plants, soil, water, wildlife, and air. Emphasis on western U.S. forest and shrub ecosystems. 2 lectures, 1 laboratory.

NR 308. Fire and Society. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Prehistorical and historical record of human use of and attitude toward fire. Mythology and religion of fire. Traditional, cultural and ethnic variations and their influence on modern U.S. institutions involved in managing fire. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ES/NR 308. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 310. Global Climate Change. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Examination and assessment of the physical and biological mechanisms that maintain current global climate regimes and the broad natural resource, political, and social conflict associated with a changing climate system. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 312. Technology of Wildland Fire Management. 4 units

Term Typically Offered: F
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Sustainability Related

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Historic, current and future perspectives of wildland fire in California. Sustainability and ecosystem health. The use of models and technology to solve complex land management problems. Assumptions and limitations of fire behavior and suppression models. 3 lectures, 1 activity. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 314. Environmental Life-Cycle Analysis. 4 units

Term Typically Offered: F, W, SP
Prerequisite: BIO 263, NR 304, NR 305, or NR 306.

Estimation and assessment of environmental impacts of human activity and product development using life-cycle analysis methodology; organization and presentation of modeling results. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

NR 315. Forest Mensuration. 4 units

Term Typically Offered: W, SP

Prerequisite: BRAE 237 or BRAE 239; NR 215; and STAT 217 or STAT 218.

Recommended: MATH 161 or MATH 221.

Principles and methods of sampling and measurement for forest and natural resource quantities and qualities. Modeling and estimation for tree volumes, stand structure and composition, and related forest vegetation. Applications in sampling, statistical and inventory techniques. Field trip required. 2 lectures, 2 laboratories.

NR 316. Environmental Literacy: An Integrative STEM Approach. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: Introductory statistics course.

Examination of local environmental challenges with systems thinking strategies and tools. Explore natural and human factors shaping coastal watersheds. Design for environmental education, analyze science data and practices, develop critical environmental literacy, and practice culturally inclusive communication strategies. Field trip required. 3 seminars, 1 activity. Crosslisted as NR/SCM 316.

NR 317. The World of Spatial Data and Geographic Information Technology. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Foundation for understanding the world through geographic information as well as the tools available to utilize spatial data. Experience with Geographic Information Systems (GIS) and related technology. Not open to students with credit in GEOG 218 or LA/NR 218. 3 lectures, 1 activity. Crosslisted as LA/NR 317. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 320. Watershed Processes and Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: NR/LA 218 and SS 120. Recommended: NR 304, NR 305, or NR 306.

Introduction, analysis, and measurement of watershed processes of precipitation, evapotranspiration, streamflow, stream channels, erosion, and riparian functions. Watershed management toward aquatic habitat and water quality goals. Weekend field trip required. 3 lectures, 1 laboratory.

NR 321. Water Resources Technology and Society. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Study of technologies for sustainable management of water resources. Focus on monitoring of drinking water supply and quality, groundwater wells, surface water storage and conveyance systems, industrial, and oil/gas water use and management, and stresses due to climate change. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 323. Human Dimensions in Natural Resources Management. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area D1.

Social, economic, political and ecological conditions and institutions that influence decisions affecting the environment; examination of human-caused environmental impacts and how they in turn influence social institutions. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 324. Social Dimensions of Sustainable Food and Fiber Systems. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Historical, political, socio-economic, and cultural dimensions of sustainable food and fiber systems. Overview of frameworks used for understanding agro-ecological sustainability with an emphasis on human elements. Exploration of core sustainability concepts, practices, and goals through case studies. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 326. Natural Resources Economics and Valuation. 4 units

Term Typically Offered: F, W

Sustainability Focused

Prerequisite: MATH 161 or MATH 221 or equivalent. Recommended: GE Area D2 (ECON 201 recommended), AGB 212.

Theory of efficient use of renewable and nonrenewable natural resources, including methods for attaching value to marketable and non-market natural resources. Environmental economic theories and techniques to address allocation of water, timber, wildlife/fisheries, open space, and recreation. 4 lectures.

NR 328. Environmental Leadership and Community Engagement. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); one lower-division course in GE Area D; and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Theories and practices of leadership and community engagement for a wide range of environmental issues. Development of personal leadership skills and methods for effectively working with non-profit organizations, governmental agencies, community groups, and the private sector to advance sustainability principles. 4 lectures. Crosslisted as NR/RPTA 328. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 335. Conflict Management in Natural Resources. 4 units

Term Typically Offered: W, SP

Prerequisite: NR 141 or NR 142. Recommended: PSY 201 or PSY 202.

Application of behavioral science principles and techniques in the management of natural resource systems. Management of internal and external human resource issues and concerns in natural resources organizations is emphasized. 3 lectures, 1 laboratory.

NR 339. Internship in Forest and Natural Resources. 1-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Consent of instructor.

Selected students will spend up to 12 weeks with an approved firm or agency engaged in forest or natural resources management. Applying and developing managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Credit/No Credit grading.

NR 340. Wildland Fire Management. 3 units

Term Typically Offered: F

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: NR 204.

Wildland fuels, fire weather, and fire danger ratings in chaparral, grassland, and forested areas. Advanced modeling of surface and crown fire behavior. Fire management strategies and implications, policies and objectives of fire management organizations. Saturday field trips may be required. 3 lectures.

NR 341. Wildland Fire Behavior. 4 units

Term Typically Offered: W

Prerequisite: Junior standing. Recommended: NR 204.

Assessment of factors influencing wildland fire behavior in grassland, shrubland, and forested ecosystems. Impacts of fuels, weather, and/or topography on wildland fire behavior. Examination of extreme fire behavior. Fire behavior prediction systems employed at stand-level and landscape-level. 3 lectures, 1 laboratory.

NR 349. Water for a Sustainable Society. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Historical, political, economic, socio-technical, and cultural dimensions of water sustainability. Overview of complex systems with an emphasis on individual choices and their impact on water sustainability. Exploration of core sustainability concepts; practices, barriers and goals related to water resources. Course offered online only. 4 lectures. Crosslisted BRAE/NR 349. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 350. Urban Forestry. 3 units

Term Typically Offered: F

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: NR 208.

Establishment and management of municipal forests, wildland-urban interface, wildlife habitat, and pollution abatement. Management of forest areas requiring special attention because of heavy recreational use, fire hazard, watershed, and societal values. Full-day field trips may be required. 2 lectures, 1 laboratory.

NR 351. Introduction to Emergency Management in California. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs) or GE Area D.

Emergency management emphasizing the Standardized Emergency Management System (SEMS) and Emergency Operations Center (EOC) operations. Earthquake hazard used as the case to explore potential wide geographic impacts, multiple secondary hazards, and multidisciplinary problem-solving methods in natural disasters faced by local governments and communities. 2 lectures, 1 activity. Crosslisted as CRP/NR 351.

NR 355. Drone Assisted Surveying. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 237 or BRAE 239.

Integration of remote sensing, surveying, natural resource management, applied drone technology. Understanding laws, regulations, measurement concepts, and big data. Field applications using Unmanned Aerial Systems and Global Navigation Satellite Systems. Creation of maps and supporting documents for use in GIS. 2 lectures, 2 laboratories. Crosslisted as BRAE/NR 355.

NR 360. Ethnicity and the Land. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C. Recommended: Lower-division Ethnic Studies (ES) course and introductory natural resources course.

Comparative study of how race and culture shape landscapes, and how social hierarchies allocate the use of natural resources and the burdens of environmental pollution. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/NR 360. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

NR 363. Undergraduate Seminar. 2 units

Term Typically Offered: F, W, SP
 Prerequisite: Junior standing.

Introduction to professional practices, including preparation of professional materials and interview skills. Review of current published research and library researching techniques in environmental science and management. Development of presentation skills. Course may be offered in classroom-based or online format. 2 seminars.

NR 365. Silviculture and Fuels Management. 4 units

Term Typically Offered: W
 Sustainability Focused
 Prerequisite: NR 208 and NR 315. Corequisite: NR 260; and NR 304, NR 305, or NR 306.

Applied forest ecology focusing on development of prescriptions for achieving diverse forest ecosystem management objectives. Topics include natural stand dynamics, silvicultural systems, hazardous fuels reduction, forest health assessments/diagnoses, emulating natural disturbances, and managing ecosystem services. Overnight and/or weekend field trips required. 2 lectures, 2 laboratories.

NR 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP
 Prerequisite: Consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 12 units.

NR 401. Disaster Recovery. 3 units

Term Typically Offered: TBD
 Prerequisite: CRP/NR 351.

Strategies and procedures for public sector management of recovery from disasters. Understanding the role of, and relationship between, federal, state and local agencies to provide assistance to individuals and communities in the post-disaster environment. Issues in the recovery process. 2 lectures, 1 activity. Crosslisted as CRP/NR 401.

NR 402. Forest Health. 4 units

Term Typically Offered: W
 Prerequisite: BIO 162, BIO 222, BIO 227, or NR 208; and NR 304, 305, or NR 306; and junior standing.

Impact and losses to forested areas caused by physical and biotic agents (such as insects and diseases) other than fire; relation of direct and indirect control practices to forest management. Saturday field trips required. 3 lectures, 1 laboratory.

NR 404. Environmental Law. 4 units

Term Typically Offered: F, SP
 Sustainability Related
 Prerequisite: Junior standing.

Detailed examination of the law governing use and protection of natural resources with focus on the legal institutions entrusted with the public duty of protecting the environment. 4 lectures. Crosslisted as CRP/NR 404.

NR 406. Indigenous Peoples and International Law and Policy. 4 units

Term Typically Offered: SP
 Prerequisite: ES 253; and NR 141 or NR 142; and junior standing required.

Interdisciplinary examination of the evolution of international law effecting indigenous peoples in the U.S. and in the Americas. Development of international legal and sociological norms and their impact on human rights of indigenous peoples with particular attention to environmental issues. 4 lectures. Crosslisted as ES/NR 406.

NR 408. Water Resource Law and Policy. 4 units

Term Typically Offered: W
 Prerequisite: Junior standing.

Detailed examination of the various legal systems of water use, regulation and management in California and the United States. Discussion on the key concepts and principles of state, federal and interstate water quantity and quality control; focusing on issues and problems, why conflicts occur and how solutions evolve. 4 lectures. Crosslisted as CRP/NR 408.

NR 412. Senior Assessment Project. 3 units

Term Typically Offered: TBD
 Prerequisite: NR 326 and completion of GE Area A3 with grades of C- or better.

Principles and practices of integrated sampling and inventory of natural resource values in terrestrial ecosystems, culminating in a student project report. 2 lectures, 1 laboratory.

NR 413. Agricultural Law. 4 units

Term Typically Offered: TBD
 Sustainability Related
 Prerequisite: Junior standing.

Analysis of agricultural law and policy including the business of agriculture, agricultural legislation, and coverage of contemporary agricultural issues such as water, food safety, and labor. Examination of statutory, judicial, policy and administrative areas in agriculture. 4 lectures.

NR 414. Sustainable Forest Management. 4 units

Term Typically Offered: W
Prerequisite: NR 326, NR 365.

Biophysical, economic, social and political influences on optimal forest management for purposes of providing sustained yields of goods and services. Growth and yield modeling; forest investment analysis; sustainable forest production; harvest schedule modeling. Day field trip required. 3 lectures, 1 laboratory.

NR 416. Environmental Impact Analysis and Management. 4 units

Term Typically Offered: F, W, SP
Sustainability Related
Prerequisite: one of the following: BIO 263, NR 304, NR 305, NR 306, or SS 221.

National Environmental Policy and California Environmental Quality Acts as applied to environmental and natural resource management problems and projects. Intent, purpose and history of the laws; differences between laws identified. Request for proposals and preparation of environmental assessment documents covered. 3 lectures, 1 laboratory.

NR 418. Applied GIS. 3 units

Term Typically Offered: F, W, SP
Prerequisite: LA/NR 218 or GEOG 318.

Acquisition, organization and analysis of spatial data from diverse sources using Geographic Information System (GIS) software. GIS modeling applications and validation techniques used in development and preparation of client-driven projects. 1 lecture, 2 activities.

NR 420. Watershed Assessment and Protection. 4 units

Term Typically Offered: SP
Prerequisite: NR 320; or graduate standing.

Analysis of streamflow, peak flows, and land management effects using established techniques and hydrologic models. Fluvial processes, sediment transport, and channel restoration techniques. Assessment and restoration of watersheds toward protection of aquatic and public resources. Field trip may be required. 3 lectures, 1 laboratory.

NR 421. Wetlands. 4 units

Term Typically Offered: TBD
Prerequisite: BOT 121 or BIO 162; CHEM 127; and SS 120 or SS 130.
Recommended: one of the following: BIO 327, BOT 313, BOT 326, MSC1 300, NR 304, NR 305, or NR 306.

The formation, characteristics, and functions of wetlands. Genesis of hydric soils. Plant adaptations to saturated soils. Wetlands as wildlife habitat. Policies and social issues associated with wetlands. The procedures of wetland delineations. 3 lectures, 1 laboratory. Crosslisted as BIO/NR/SS 421.

NR 422. Stream Measurements and Water Quality Monitoring. 1 unit

Term Typically Offered: SP
Sustainability Related
Prerequisite: Junior standing or consent of instructor.

Field measurement of streamflow, water quality, and water resources to support environmental evaluations of local water resources. Application of quality assurance procedures for monitoring water resources. Field trip required. Total credit limited to 2 units. 1 laboratory.

NR 425. Applied Resource Analysis and Assessment. 4 units

Term Typically Offered: F, W, SP
Sustainability Related
Prerequisite: NR 363 and NR 416.

Environmental impacts in responses to resource management, projects, programs and activities. Preparation, implementation, and coordination of environmental plans. Criteria for measurements, interpretation, and evaluation. Resource inventories, analysis, evaluation, synthesis, environmental assessment writing and preparation. 3 lectures, 1 laboratory.

NR 434. Wood Properties, Products and Sustainable Uses. 4 units

Term Typically Offered: TBD
Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Principles of wood properties, green building practices, sustainable and efficient use of renewable wood resources including methods for using wood as an energy source. Field trips required. 3 lectures, 1 laboratory.

NR 435. Environmental Policy Analysis. 4 units

Term Typically Offered: F, SP
Prerequisite: NR 326. Recommended: NR 335.

Policy process approach to understanding the efforts to resolve natural resource problems in the public and private sector. Principles and techniques used to analyze the effects of environmental policies. Analysis of major federal and state environmental laws. 4 lectures.

NR 445. Systems Thinking in Environmental Management. 4 units

Term Typically Offered: F
Sustainability Focused
Prerequisite: One of the following: BIO 263, NR 304, NR 305, NR 306, or SS 321. Recommended: MATH 161.

Analysis of environmental challenges by incorporating systems thinking and system dynamics simulations with quantitative models; interpretation of modeling results and their social and political implications. 4 lectures.

NR 455. Wildland-Urban Fire Protection. 4 units

Term Typically Offered: SP
Prerequisite: Junior standing. Recommended: NR 340.

Biophysical and socioeconomic issues affecting wildland fire management in urbanized landscapes. Fire risk assessment. Pre-fire prevention, mitigation, and preparedness, during-fire response, and post-fire recovery actions by public- and private-sector agencies and residents. 3 lectures, 1 laboratory.

NR 464. Senior Project - Ecological Restoration. 4 units

Term Typically Offered: SP
Prerequisite: One of the following: NR 304, NR 305, NR 306, SS 321, or SS 422.

Targeted study and application of ecological restoration concepts, theories, and practices. Evaluate benefits and limitations of restoration strategies in California. Develop and execute an applied restoration project in San Luis Obispo County. Satisfies senior project requirement. Field trip required. 3 lectures, 1 laboratory.

NR 465. Senior Project - Ecosystem Management. 4 units

Term Typically Offered: W, SP

Sustainability Focused

Prerequisite: NR 326 and NR 416.

Capstone course integrating biophysical, economic and socio-political sciences. Principles, concepts and techniques designed to utilize resources while sustaining ecosystem health within acceptable limits of change. Ecosystem assessment, planning, management and monitoring project. Satisfies the senior project requirement. 3 lectures, 1 activity.

NR 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

NR 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Junior standing.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

NR 472. Leadership Practice. 1 unit

Term Typically Offered: W, SP

Prerequisite: Junior standing.

Tasks associated with development of personal leadership skills. Study and practice in setting goals and objectives; developing, evaluating and implementing a project independently and as part of a team; decision making and problem-solving emphasized. Total credit limited to 4 units. 1 laboratory. Crosslisted as NR/RPTA 472.

NR 474. Forest Stewardship Practices. 8 units

Term Typically Offered: TBD

Sustainability Focused

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); and junior standing. Concurrent: NR 475.

Sustainable forest management, ecosystem sampling and inventory methods, photo interpretation, hydrologic resources, road condition, project impact analysis, and best management practices related to forest stewardship. Guest lecturers from industry, agencies and universities share their perspectives on forest stewardship practices. Field trip required. 5 lectures. 3 activities.

NR 475. Senior Project - Forest Stewardship. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); and junior standing. Concurrent: NR 474.

Sustainable forest practices and regulatory compliance issues related to Timber Harvest Plans (THP). Development of THP for specified project sites. Collection, assessment, interpretation of data culminating in production of a THP acceptable for interagency review. Satisfies senior project requirement. Field trip required. 3 lectures, 1 activity.

NR 476. Senior Project - Advanced Internship Experience in Environmental Science/Management. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Independent internship experience conducted under faculty supervision focusing on a discipline area of environmental science/management. Completion of a project as a component of their internship. Satisfies the senior project requirement. Minimum 90 hours required. Crosslisted as ERSC/NR 476.

NR 477. Senior Project - Research Experience in Environmental Science. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Guided research experience in a specific area of environmental science. Implementation of materials and methods. Collection, analysis and interpretation of data. Completion of formal written report. Satisfies senior project requirement. 1 lecture, 2 laboratories. Crosslisted as ERSC/NR 477.

NR 478. Senior Project - Current Topics in Environmental Science/Management. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Critical evaluation and formal presentation of current issues in environmental science/management. Evaluation of current topics, analysis of supporting evidence, and synthesis and presentation of resulting perspectives on different approaches to current challenges in environmental science/management. Satisfies the senior project requirement. 3 lectures. Crosslisted as ERSC/NR 478.

NR 479. Senior Project - Independent Study. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; ERSC 363 or NR 306 or NR 326; and consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time. Crosslisted as ERSC/NR 479.

NR 532. Applications in Biometrics and Econometrics. 4 units

Term Typically Offered: TBD

Prerequisite: One course in undergraduate statistics, graduate standing, or consent of instructor.

Parametric and semi-parametric statistical methods in modeling biological and economic phenomena. Biometric modeling of stand growth and inventory. Econometric modeling of market and environmental values. 3 lectures, 1 laboratory.

NR 534. Environmental Modeling. 3 units

Term Typically Offered: TBD

Prerequisite: One course in statistics or graduate standing.

Methods and modeling approaches used in quantifying ecological and environmental processes and conditions, such as fire behavior, wildland hydrology, terrestrial and aquatic habitat condition, using GIS and other models. 2 lectures, 1 laboratory.

NR 539. Graduate Internship in Forest Resources. 1-9 units

Term Typically Offered: TBD

Prerequisite: Consent of internship instructor.

Application of theory to the solution of problems of forest resources or related businesses in the field. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units.

NR 570. Selected Topics in Forest Resources. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

NR 571. Selected Topics Forest Resources Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 laboratories.

NR 575. Applications in Advanced Watershed Hydrology. 2 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor. Recommended: NR 420.

Techniques and applications in watershed hydrology to real-world projects. Projects could include water quality or quantity assessments, water quality or channel morphology monitoring, and structural and non-structural enhancements for channel and upland watersheds, culminating in a final report and presentation. 2 laboratories.