NATURAL RESOURCES (NR)

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NR Courses

NR 1140 Careers in Natural Resources Management and Environmental Sciences (1 unit)
Term Typically Offered: TBD

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 seminar. Formerly NR 140.

NR 1141 Introduction to Forest Ecosystem Management (4 units)
Term Typically Offered: F

Fundamentals of forestry including basic silviculture, forest protection, measurement and policy. Integrated resource management of forest lands for multiple uses. Introduction to land and resource measurements, including field instruments, property description, map and photograph reconciliation, and data accuracy and precision. Field trip required. 3 lectures, 1 laboratory. Formerly NR 141.

NR 1142 Environmental Management (4 units)
Term Typically Offered: F, SP

An introduction to environmental management as a field and orientation for ENVM majors. Explores the effects of human activities on the natural environment as well as past and current efforts to balance human resource demands with ecosystem integrity. 3 lectures, 1 activity. Formerly NR 142.

NR 2200 Special Problems for Undergraduates (1-12 units)
Term Typically Offered: F, SP
CR/NC
Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Credit/No Credit grading only. Repeatable up to 12 units. Formerly NR 200.

NR 2203 Resource Law Enforcement (3 units)
Term Typically Offered: TBD

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. Formerly NR 203.

NR 2204 Wildland Fire Control (3 units)
Term Typically Offered: F, SP

Fire control techniques for various wildland fuels. Elementary fire physics, fuels, weather, fire behavior, fire suppression techniques, line construction, "mop-up", fire line safety, air operations, and fire organization. Meets wildland fire fighter certification for United States Forest Service (USFS). Partially meets California Department of Forestry (CDF) Firefighter I. 2 lectures, 1 laboratory. Formerly NR 204.

NR 2208 Dendrology (3 units)
Term Typically Offered: F, SP
Recommended: BOT 121 or BOT 1121.

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, 1 laboratory. Formerly NR 208.

NR 2218 Introduction to Geographic Information Systems (GIS) (3 units)
Term Typically Offered: F, SP

Fundamental concepts and functions of Geographic Information Systems (GIS). Create, manage, analyze, and display geographically referenced data. Explore how GIS is applied to analyze environmental, social, and natural resource issues. 2 lecture, 1 laboratory. Crosslisted as LA/NR 2218. Formerly LA/NR 218.

NR 2270 Special Topics (1-4 units)
Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of special topics. The Class Schedule will list topic selected. Repeatable up to 8 units. 1 to 4 lectures. Formerly NR 270.

NR 2290 Intercollegiate Forestry Activities (1 unit)
Term Typically Offered: F, SP
CR/NC
Prerequisite: Consent of instructor.

Beginning through advanced skills in the event areas of college forestry activities. Instruction in use of specialized equipment and safety. Field trip required. Repeatable up to 8 units. Credit/No Credit grading only. 1 laboratory. Formerly NR 290.

NR 2350 Urban Forestry (3 units)
Term Typically Offered: F
Recommended: NR 208 or NR 2208.

Establishment and management of municipal forests, wildland-urban interface, wildlife habitat, and pollution abatement. Management of forest areas with a focus on addressing challenges related to heavy recreational use, fire hazard, watershed, and societal values. Field trip required. 2 lectures, 1 laboratory. Replaces NR 350.

NR 3304 Agroecology (4 units)
Term Typically Offered: SP
2026-28 or later: Upper-Div GE Area 2/5
2020-26 catalogs: Upper-Div GE Area B
Sustainability Focused
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and one of the following: STAT 218, STAT 252, STAT 301, STAT 312, STAT 1110, STAT 1220, STAT 1510, or STAT 3210.

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 Areas Upper-Division 2 or Upper-Division 5 (GE Area Upper-Division B for students on the 2020-26 catalogs). Formerly NR 304.

NR 3305 Forest and Fire Ecology (4 units)
Term Typically Offered: F, SP
Prerequisite: Completion of GE Area 5B (GE Area B2 for the 2020-26 catalogs); and completion of GE Area 5C (GE Area B3 for the 2020-26 catalogs).

Examination of major forest types and processes that determine their development and productivity across the earth (silvics). Overview of the biophysical dynamics of fire and its interactions with vegetation structure and fuels management. Field trip required. 3 lectures, 1 laboratory. Formerly NR 305.

NR 3306 Natural Resource Ecology and Habitat Management (4 units)
Term Typically Offered: F, SP
Prerequisite: Completion of GE Area 5B (GE Area B2 for the 2020-26 catalogs); and completion of GE Area 5C (GE Area B3 for the 2020-26 catalogs).

Ecology and management implications in North American ecosystems. Importance of maintaining natural dynamics of energy flow and nutrient cycles at the community and ecosystem levels for sustainability. Humanity's role as principal factor of change of the resources in natural systems. Field trip required. 3 lectures, 1 laboratory. Formerly NR 306.

NR 3308 Fire and Society (3 units)
Term Typically Offered: F, SP
2026-28 or later: Upper-Div GE Area 4
2020-26 catalogs: Upper-Div GE Area D
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of one lower-division course in GE Area 4 (GE Areas D1 or D2 for the 2020-26 catalogs).

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 United States institutions involved in managing fire. Course may be offered in classroom-based or online format. 3 lectures. Fulfills GE Upper-Division 4 (GE Area Upper-Division D for students on the 2020-26 catalogs). Formerly ES/NR 308.

NR 3310 Global Climate Change (3 units)
Term Typically Offered: F, SP
2026-28 or later: Upper-Div GE Area 2/5
2020-26 catalogs: Upper-Div GE Area B
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 5 (GE Areas B1 to B3 for the 2020-26 catalogs).

Global climate change ranks among the most impactful environmental challenges humans have faced. Exploration of biophysical mechanisms governing the climate system, the drivers of climate change, and the implications of these unprecedented changes for Earth's coupled human-environmental systems. 3 lectures. Fulfills GE Areas Upper-Division 2 or Upper-Division 5 (GE Area Upper-Division B for students on the 2020-26 catalogs). Formerly NR 310.

NR 3312 Technology of Wildland Fire Management (3 units)
Term Typically Offered: TBD
2026-28 or later: Upper-Div GE Area 2/5
2020-26 catalogs: Upper-Div GE Area B
Sustainability Related
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 5 (GE Areas B1 to B3 for the 2020-26 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. 2 lectures, 1 activity. Fulfills GE Areas Upper-Division 2 or Upper-Division 5 (GE Area Upper-Division B for students on the 2020-26 catalogs). Formerly NR 312.

NR 3315 Forest Mensuration (4 units)
Term Typically Offered: SP
Prerequisite: One of the following: BRAE 237, BRAE 239, BRAE 1239, or BRAE 2237; NR 141 or NR 1141; and STAT 218 or STAT 1110.

Principles and methods of sampling and measurement for forest and natural resource quantities, determination of density measures, and site index. Modeling and estimation for tree volumes, stand structure, and composition. Applications in sampling, statistical, and inventory techniques. Field trip required. 3 lectures, 1 laboratory. Formerly NR 315.

NR 3316 Environmental Literacy: An Integrative STEM Approach (3 units)
Term Typically Offered: SP
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 5 (GE Areas B1 to B3 for the 2020-26 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. 2 seminars, 1 activity. Crosslisted as NR/SCM 3316. Formerly NR/SCM 316.

NR 3317 The World of Spatial Data and Geographic Information Technology (3 units)
Term Typically Offered: TBD
2026-28 or later: Upper-Div GE Area 2/5
2020-26 catalogs: Upper-Div GE Area B
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 5 (GE Areas B1 to B3 for the 2020-26 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, GEOG 2218, LA/NR 218, or LA/NR 2218. 2 lectures, 1 activity. Crosslisted as LA/NR 3317. Fulfills GE Areas Upper-Division 2 or Upper-Division 5 (GE Area Upper-Division B for students on the 2020-26 catalogs). Formerly LA/NR 317.

NR 3318 Introduction to Environmental Data Science (3 units)
Term Typically Offered: TBD
Prerequisite: LA/NR 218 or LA/NR 2218; and STAT 218 or STAT 1110.

Introduction to methods and applications in environmental data science. Computer programming to manipulate and analyze environmental data. Techniques to import, clean, analyze, model, and visualize environmental data. Introduction to data sources in forestry, fire science, natural resources, and environmental science. 2 lectures, 1 laboratory.

NR 3319 Watershed Processes and Management (2 units)
Term Typically Offered: F, SP
Prerequisite: LA/NR 218 or LA/NR 2218; and SS 120 or SS 1120. Concurrent: NR 3320 and Forest and Fire Science, Water Science concentration major.

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. Field trip required. 2 lectures. Formerly NR 320.

NR 3320 Watershed Processes and Management Laboratory (1 unit)
Term Typically Offered: F, SP
Prerequisite: LA/NR 218 or LA/NR 2218; and SS 120 or SS 1120. Concurrent: NR 3319 and Forest and Fire Science, Water Science concentration major.

Evaluation, analysis, or measurement of watershed processes of precipitation, evapotranspiration, streamflow, stream channels, erosion, assessment of riparian functions, stream ecology, and water quality. Field trip required. 1 laboratory.

NR 3321 Water Resources Technology and Society (3 units)
Term Typically Offered: TBD
2026-28 or later: Upper-Div GE Area 2/5
2020-26 catalogs: Upper-Div GE Area B
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 5 (GE Areas B1 to B3 for the 2020-26 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 and gas water use and management and stresses due to climate change. 3 lectures. Fulfills GE Areas Upper-Division 2 or Upper-Division 5 (GE Area Upper-Division B for students on the 2020-26 catalogs). Formerly NR 321.

NR 3323 Human Dimensions in Natural Resources Management (3 units)
Term Typically Offered: F, SP
2026-28 or later: Upper-Div GE Area 4
2020-26 catalogs: Upper-Div GE Area D
Sustainability Focused
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); Completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 4A (GE Area D1 for the 2020-26 catalogs).

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. 3 lectures. Fulfills GE Upper-Division 4 (GE Area Upper-Division D for students on the 2020-26 catalogs). Formerly NR 323.

NR 3324 Social Dimensions of Sustainable Food Systems (3 units)
Term Typically Offered: SP
2026-28 or later: Upper-Div GE Area 4
2020-26 catalogs: Upper-Div GE Area D
Sustainability Focused
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of lower-division courses in GE Area 4 (GE Areas D1 and D2 for the 2020-26 catalogs).

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. 3 lectures. Fulfills GE Upper-Division 4 (GE Area Upper-Division D for students on the 2020-26 catalogs). Formerly NR 324.

NR 3326 Natural Resources Economics and Valuation (3 units)
Term Typically Offered: TBD
Prerequisite: Junior standing.

Theory of efficient use of renewable and nonrenewable natural resources, including methods for non-market valuation. Economic perspectives of sustainability and climate change. Environmental and ecological economic theories and techniques to address allocation of water, timber, wildlife/fisheries, open space, and recreation. 3 lectures. Crosslisted as AGB/NR 3326. Formerly NR 326.

NR 3328 Environmental Leadership and Community Engagement (3 units)
Term Typically Offered: TBD
2026-28 or later: Upper-Div GE Area 4
2020-26 catalogs: Upper-Div GE Area D
Sustainability Focused
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of one lower-division course in GE Area 4 (GE Areas D1 or D2 for the 2020-26 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. Course may be offered in classroom-based or online format. 3 lectures. Crosslisted as EIM/NR 3328. Fulfills GE Upper-Division 4 (GE Area Upper-Division D for students on the 2020-26 catalogs). Formerly NR/RPTA 328.

NR 3335 Conflict Management in Natural Resources (4 units)
Term Typically Offered: F, SP
2026-28 or later: Upper-Div GE Area 4
2020-26 catalogs: Upper-Div GE Area D
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of one lower-division course in GE Area 4 (GE Areas D1 or D2 for the 2020-26 catalogs).

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. Fulfills GE Upper-Division 4 (GE Area Upper-Division D for students on the 2020-26 catalogs).

NR 3339 Internship in Natural Resources and Environmental Sciences (1-8 units)
Term Typically Offered: F, SP, SU
CR/NC
Prerequisite: NR 140 or NR 1140; or one of the following: ERSC 144, ERSC 1144, NR 141, NR 142, NR 1141, or NR 1142; and consent of instructor.

Work with an approved firm or agency engaged in natural resources or environmental management, education, research, policy, or monitoring. Apply and develop professional skills and competencies. Repeatable up to 8 units. Credit/No Credit grading. Formerly NR 339.

NR 3340 Wildland Fire Management (2 units)
Term Typically Offered: F
Prerequisite: Junior standing. Recommended: NR 204 or NR 2204.

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. Field trip required. 2 lectures. Formerly NR 340.

NR 3341 Wildland Fire Behavior (3 units)
Term Typically Offered: TBD
Prerequisite: Junior standing. Recommended: NR 204 or NR 2204.

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. 2 lectures, 1 laboratory. Formerly NR 341.

NR 3349 Water for a Sustainable Society (3 units)
Term Typically Offered: TBD
2026-28 or later: Upper-Div GE Area 4
2020-26 catalogs: Upper-Div GE Area D
Sustainability Focused
Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of one lower-division course in GE Area 4 (GE Areas D1 or D2 for the 2020-26 catalogs).

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. 3 lectures. Crosslisted as BRAE/NR 3349. Fulfills GE Upper-Division 4 (GE Area Upper-Division D for students on the 2020-26 catalogs). Formerly BRAE/NR 349.

NR 3360 Ethnicity, Culture, and the Environment in the United States (3 units)
Term Typically Offered: TBD
Prerequisite: Junior standing or one of the following: Environmental Earth and Soil Sciences major, Environmental Management and Protection major, or Forest and Fire Sciences major; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 3B (GE Area C2 for the 2020-26 catalogs).

Exploration of how ethnicity and culture shape landscapes and how social hierarchies structure access to and impacts from natural resource use in the United States. Examination of how social values, land ethics, and environmental contexts influence human-environment relationships, with emphasis on systemic inequities affecting marginalized communities. 3 lectures.

NR 3363 Career Preparation and Practices in Natural Resources Fields (2 units)
Term Typically Offered: F, SP
Prerequisite: Junior standing.

Introduction to professional practices, including preparation of professional materials and interview skills. Review and presentation of current published research and library researching techniques in environmental science/management and forestry and fire sciences. Development of presentation skills. Course may be offered in classroom-based or online format. 2 seminars. Formerly NR 363.

NR 4365 Silviculture and Fuels Management (4 units)
Term Typically Offered: F
Prerequisite: NR 208 or NR 2208; and NR 315 or NR 3315. Recommended: One of the following: NR 304, NR 305, NR 306, NR 3304, NR 3305, or NR 3306.

Forest ecology focusing on the development of sustainable forest management practices for achieving diverse forest ecosystem management objectives in US forests. Natural forest ecology, silvicultural systems and forest regeneration, and forest ecosystem services. Field trip required. 3 lectures, 1 laboratory. Formerly NR 365.

NR 4400 Special Problems for Advanced Undergraduates (1-4 units)
Term Typically Offered: F, SP
Prerequisite: Consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Repeatable up to 12 units. Formerly NR 400.

NR 4402 Forest Health and Disturbance Ecology (3 units)
Term Typically Offered: SP
Prerequisite: Junior standing; one of the following: BIO 162, BIO 222, BIO 227, BIO 2215, BIO 2217, NR 208, or NR 2208; and one of the following: NR 205, NR 304, NR 305, NR 306, NR 3304, NR 3305, or NR 3306.

Impact and losses to forested areas caused by physical and biotic agents with a special focus on insects, diseases, drought, and wildfire. Relation of direct and indirect control practices to forest management. 3 lectures. Formerly NR 402.

NR 4403 Forest Health and Disturbance Ecology Laboratory (1 unit)
Term Typically Offered: SP
Concurrent: NR 4402.

Overview of disturbance ecology agents and abiotic events. Laboratory analysis of common forest microbes, development of techniques for isolating microbes, field identification of signs of insect damage, examination of interactions between biotic agents and abiotic events focusing on wildfire. Field trip required. 1 laboratory.

NR 4404 Environmental Law (4 units)
Term Typically Offered: F
Prerequisite: Junior standing; completion of GE Area 1 (GE Area A for the 2020-26 catalogs).

Investigation of law as a tool for furthering environmental planning, management and protection with focus on federal environmental laws including the Clean Water Act, Clean Air Act, and Endangered Species Act. Legal research skills and legal analysis. 4 lectures. Crosslisted as CRP/NR 4404. Formerly CRP/NR 404.

NR 4408 Water Resource Law and Policy (4 units)
Term Typically Offered: SP
Prerequisite: Junior standing and completion of GE Area 1 (GE Area A for the 2020-26 catalogs); or graduate standing.

Examination of water quality and quantity regulation and management in California, the United States, and globally. Coverage of freshwater and marine water issues. Research case study on water law and policy development. 4 lectures. Crosslisted as CRP/NR 4408. Formerly CRP/NR 408.

NR 4413 Agricultural Law (4 units)
Term Typically Offered: TBD
Prerequisite: Junior standing; and completion of GE Area 1 (GE Area A for the 2020-26 catalogs).

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. Formerly NR 413.

NR 4414 Sustainable Forest Management and Forest Operations (2 units)
Term Typically Offered: F
Prerequisite: One of the following: ECON 201, ECON 2001, NR 326, or NR 3326; and NR 315 or NR 3315. Recommended: NR 365 or NR 4365.

Biophysical, economic, social and political influences on optimal forest. Relationships between sustainable forests, ecosystem services, operational practices, forest road design, safety in forest operations, and environmental protection. Forest investment analysis and sustainable forest production. Field trip required. 1 lecture, 1 laboratory. Formerly NR 414.

NR 4416 Environmental Impact Analysis and Management (4 units)
Term Typically Offered: F, SP
Prerequisite: Junior standing.

National Environmental Policy and California Environmental Quality Acts applied to private and public planning, development, and restoration projects. Intent, purpose, and application of the laws. Differences and similarities between laws and relationship with other environmental regulations. Review of real-world case studies. 3 lectures, 1 laboratory. Formerly NR 416.

NR 4417 Natural Resource Protection and Policy (3 units)
Term Typically Offered: F
Prerequisite: Junior standing.

Overview of regulations pertaining to natural resource protection and management of public and private lands. Current environmental and natural resource law issues and disputes, focusing on evaluation of environmental impacts of public and private projects, programs, and activities. Course may be offered in classroom-base or online format. 3 lectures.

NR 4418 Applied Geographic Information System (2 units)
Term Typically Offered: F, SP
Prerequisite: One of the following: GEOG 218, GEOG 2218, LA/NR 218, or LA/NR 2218.

Acquisition, organization, and analysis of spatial data from diverse sources using Geographic Information System (GIS) software. GIS modeling applications, validation techniques, and quantitative reasoning are applied to develop and accomplish spatial analysis projects. 1 lecture, 1 laboratory. Formerly NR 418.

NR 4421 Wetlands (4 units)
Term Typically Offered: TBD
Prerequisite: Completion of GE Area 1 (GE Area A for the 2020-26 catalogs); and SS 120 or SS 1120. Corequisite: One of the following: BIO 114, BIO 1114, BOT 121, or BOT 1121; and one of the following: CHEM 124, CHEM 125, CHEM 1120, or CHEM 1122.

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. Procedures of wetland delineations. Field trip required. 3 lectures, 1 laboratory. Crosslisted as NR/SS 4421. Formerly NR 421.

NR 4422 Stream Measurements and Water Quality Monitoring (1 unit)
Term Typically Offered: SP
Prerequisite: Junior standing.

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. Repeatable up to 2 units. 1 laboratory. Formerly NR 422.

NR 4431 Spatial Data Analysis and Environmental Mapping (4 units)
Term Typically Offered: F
Prerequisite: One of the following: GEOG 218, GEOG 2218, LA/NR 218, or LA/NR 2218; and one of the following: STAT 217, STAT 218, or STAT 1110. Recommended: SS 321 or SS 3321.

Introduction to methods and applications in spatial data science. Use of computer programming and geographic information systems (GIS) to manipulate and analyze spatial data. Applied mapping of environmental, agricultural and natural resource data using modeling techniques. 2 lectures, 2 laboratories. Crosslisted as NR/SS 4431. Formerly SS 431.

NR 4442 Environmental Life-Cycle Analysis (3 units)
Term Typically Offered: F, SP
Prerequisite: Junior standing; completion of GE Area 1 (GE Area A for the 2020-26 catalogs); and completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs).

Assess and quantify environmental impacts of human activities, industrial production processes, and organizational sustainability performance using life-cycle analysis. Course may be offered in classroom-based or online format. 3 lectures. Formerly NR 314.

NR 4445 Systems Thinking in Environmental Management (3 units)
Term Typically Offered: F
Prerequisite: Junior standing; and completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs).

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. Course may be offered in classroom-based or online format. 3 lectures. Formerly NR 445.

NR 4460 Senior Project - Watershed Assessment and Protection (3 units)
Term Typically Offered: SP
Prerequisite: Senior standing, and NR 320 or NR 3320; or graduate standing.

Assessment of streamflow, peak flows, and land management effects using established techniques and hydrologic models. Fluvial processes, sediment transport, and stream restoration techniques. Assessment and restoration plan of a watershed toward protection of aquatic and public resources. Field trip required. 2 lectures, 1 laboratory. Formerly NR 420.

NR 4462 Senior Project - Applied Resource Analysis and Assessment (4 units)
Term Typically Offered: F, SP
Prerequisite: Senior standing and NR 416 or NR 4416.

Evaluation of environmental impacts of public and private projects, programs, and activities. Preparation, implementation, and coordination of environmental plans. Criteria for measurement, interpretation, and evaluation. Resource inventories, permitting and environmental constraints analysis, evaluation, synthesis, environmental assessment writing, and preparation. 3 lectures, 1 laboratory.

NR 4463 Senior Project - Ecological Restoration (4 units)
Term Typically Offered: SP
Prerequisite: Senior standing; and one of the following: NR 304, NR 306, NR 402, NR 3304, NR 3306, NR 4402, SS 321, SS 422, SS 3321, or SS 4422.

Targeted study and application of ecological restoration concepts, theories, and practices. Evaluate benefits and limitations of restoration strategies. Develop and execute an applied restoration project in San Luis Obispo County. Field trip required. 3 lectures, 1 laboratory. Formerly NR 464.

NR 4464 Senior Project - Environmental Policy Analysis (4 units)
Term Typically Offered: F, SP
Prerequisite: Senior standing; and one of the following: NR 404, NR 408, NR 4404, or NR 4408.

Survey of policy tools and approaches to manage environmental challenges. Analyze environmental challenges, evaluate the strengths and weaknesses of existing policy tools, and propose new policies to address policy gaps. 4 lectures. Formerly NR 435.

NR 4465 Senior Project - Ecosystem Management (4 units)
Term Typically Offered: SP
Prerequisite: Senior standing; and one of the following: Environmental Earth and Soil Sciences major, Environmental Management and Protection major, or Forest and Fire Sciences major.

Capstone course integrating biophysical and social sciences. Principles, concepts, and techniques designed to utilize resources while sustaining ecosystem health within acceptable limits of change. Ecosystem assessment, planning, and/or management project. 3 lectures, 1 laboratory. Formerly NR 465.

NR 4466 Senior Project - Wildland-Urban Interface Fire Protection (3 units)
Term Typically Offered: TBD
Prerequisite: Senior standing. Recommended: NR 340 or NR 3340.

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. Field trip required. 2 lectures, 1 laboratory. Formerly NR 455.

NR 4470 Special Advanced Topics (1-4 units)
Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of special topics for advanced students. The Class Schedule will list topic selected. Repeatable up to 8 units. 1 to 4 lectures. Formerly NR 470.

NR 4471 Special Advanced Laboratory (1-4 units)
Term Typically Offered: TBD
Prerequisite: Junior standing and consent of instructor.

Directed group laboratory study of special topics for advanced students. The Class Schedule will list topic selected. Repeatable up to 8 units. 1 to 4 laboratories. Formerly NR 471.

NR 4475 Senior Project - Forest Stewardship Practices (3 units)
Term Typically Offered: SP
Prerequisite: Senior standing; completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 5 (GE Areas B1 to B3 for the 2020-26 catalogs).

Sustainable forest management, ecosystem sampling and inventory methods, hydrologic resources, road condition, forest project impact analysis, and best management practices related to forest stewardship. Field trip required. 2 lectures, 1 laboratory. Formerly NR 474.

NR 4476 Senior Project - Advanced Internship Experience in Environmental Science/Management (2 units)
Term Typically Offered: TBD
Prerequisite: Senior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); one of the following: NR 306, NR 326, NR 363, NR 3306, NR 3326, or NR 3363; and consent of instructor.

Independent internship experience conducted under faculty supervision focusing on a discipline area of environmental science/management. Completion of a project as a component of the internship. Crosslisted as ERSC/NR 4476. Formerly ERSC/NR 476.

NR 4477 Senior Project - Research Experience in Environmental Science (2 units)
Term Typically Offered: TBD
Prerequisite: Senior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); and one of the following: NR 306, NR 326, NR 363, NR 3306, NR 3326, or NR 3363.

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. 1 lecture, 1 laboratory. Crosslisted as ERSC/NR 4477. Formerly ERSC/NR 477.

NR 4478 Senior Project - Current Topics in Environmental Science (2 units)
Term Typically Offered: F, SP
Prerequisite: Senior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); and one of the following: NR 306, NR 326, NR 363, NR 3306, NR 3326, or NR 3363.

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. 2 lectures. Crosslisted as ERSC/NR 4478. Formerly ERSC/NR 478.

NR 4479 Senior Project - Independent Study (2 units)
Term Typically Offered: TBD
Prerequisite: Senior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); and one of the following: NR 306, NR 326, NR 363, NR 3306, NR 3326, or NR 3363; and consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems that graduates must solve in their fields of employment. Project results are presented in a formal report. Crosslisted as ERSC/NR 4479. Formerly ERSC/NR 479.

NR 4480 Leadership Practice (1 unit)
Term Typically Offered: TBD
Prerequisite: Junior standing.

Tasks associated with the 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. Repeatable up to 4 units. 1 lecture. Crosslisted as NR/RPTA 4480. Formerly NR/RPTA 472.

NR 5532 Applications in Biometrics and Statistics (4 units)
Term Typically Offered: TBD
Prerequisite: One of the following: STAT 218, STAT 251, STAT 511, STAT 1110, STAT 1210, or STAT 5110; or graduate standing.

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. Formerly NR 532.

NR 5570 Special Advanced Topics (1-4 units)
Term Typically Offered: TBD
Prerequisite: Graduate standing and consent of instructor.

Directed group study of special topics for advanced students. The Class Schedule will list topics selected. Repeatable up to 12 units. Course may be offered in classroom-based or online format. 1 to 4 seminars. Formerly NR 570.

NR 5571 Special Advanced Laboratory (1-4 units)
Term Typically Offered: TBD
Prerequisite: Graduate standing and consent of instructor.

Directed group laboratory of special topics for advanced students. The Class Schedule will list topic selected. Repeatable up to 12 units. 1 to 4 laboratories. Formerly NR 571.