NR 140 Careers in Forestry and Environmental Management (1) (CR/NC)
Analysis and development of career goals in natural resources. Acquainting students with potential career options and preparation of academic plans at Cal Poly. Credit/No Credit grading. 1 activity.

NR 141 Introduction to Forest Ecosystem Management (3)
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. Recommended corequisite: NR 140.

NR 142 Environmental Management (3)
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. Recommended corequisite: NR 140.

NR 203 Resource Law Enforcement (3)
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/RFTA 203.

NR 204 Wildland Fire Control (3)
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 1 requirements. 2 lectures, 1 laboratory.

NR 205 Dendrology (4)
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, Sierra, and Cascade ecosystems. 2 lectures, 2 laboratories. Recommended: BOT 121.

NR 215 Land and Resource Measurements (2)
Introduction to land and resource measurement technology and methods – field instruments, property description, map and photograph reconciliation, data accuracy and precision. Trigonometric functions and fundamental identities especially as applied to natural resources applications. Course may be offered at Swanton Pacific Ranch during week prior to beginning of fall quarter, or weekend field trips. 1 lecture, 1 laboratory.

NR 220 Forest Resources Enterprise Project (1–4) (CR/NC)
Selection and completion of a forest management/production project under faculty supervision. Project participation is voluntary and subject to approval by the department head and the Cal Poly Corporation. Degree credit limited to 8 units. Credit/No Credit grading only. Recommended: NR 141 or equivalent.

NR 247 Forest Surveying (2)
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. Prerequisite: NR 215. Crosslisted as BRAE/NR 247.

NR 260 Forest Practices and Environmental Protection (4)
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. Recommended: NR 141, NR 247.

NR 270 Selected Topics (1–4)
Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

NR 290 Intercollegiate Forestry Activities (1) (CR–NC)
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. Prerequisite: Enrollment limited to those qualified to compete in intercollegiate forestry activities and consent of instructor.

NR 300 Computer Applications in Resource Management (2)
Resource management applications of microcomputers. Software programs include forest and natural resource management planning, forecasting, analysis of systems, and resource data base management for multiple use objectives. Use of forestry and natural resource examples. 1 lecture, 1 laboratory. Prerequisite: Consent of instructor. Crosslisted as NR/RFTA 300.

NR 306 Natural Resource Ecology and Habitat Management (4)
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. Prerequisite: Completion of GE Areas B2 and B4.

NR 307 Fire Ecology (3)
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. Prerequisite: Completion of GE Areas B2 and B4.

NR 380 Fire and Society (4)  GE D5
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. 3 lectures, 1 activity. Prerequisite: Completion of GE Area A3 and one lower division course in GE Area D. Crosslisted as E2/NR 308. Fulfills GE D5 except for Comparative Ethnic Studies majors.

NR 311 Environmental Measurements and Interpretation (4)
Measurement and interpretation of the biological, physical and social values of the natural elements of our environment; organization and presentation of interpretive materials by oral and written communication. 3 lectures, 1 laboratory. Prerequisite: NR 306 or BIO 325.

NR 312 Technology of Wildland Fire Management (4)  GE Area F
Models and technology to solve complex land management problems. Historic, current and future perspectives of wildland fire in California. Sustainability and ecosystem health. Assumptions and limitations of fire behavior and suppression models. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B2 or B3. Fulfills GE Area F.

NR 315 Measurements and Sampling in Forested Environments (4)
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. 2 lectures, 2 laboratories. Overnight, weekend field laboratories required. Prerequisite: STAT 217/218, BRAE/NR 247; recommended: MATH 161 or MATH 221 or equivalent.

NR 317 The World of Spatial Data and Geographic Information Technology (4)  GE Area F
Basic foundation for understanding the world through geographic information and tools available to utilize spatial data. Application of Geographic Information Systems (GIS) and related technologies, including their scientific basis of operation. Not open to students with credit in NR 318. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B2. Crosslisted as GEOG/LANR 317. Fulfills GE Area F.

NR 318 Applications in GIS (3)
ARC/INFO and ArcView Geographic Information System (GIS) computer software to explore environmental, natural resource, social and economic issues using spatial data. Develop and apply data base and software management competencies. 1 lecture, 2 laboratories. Prerequisite: Junior standing or consent of instructor. Crosslisted as LANR 318.
NR 319 Natural Resource Ecology, Theories and Applications (4) GE B5 Scope and nature of "ecology" in modern society, including resource terminology and classifications systems; dynamics of natural systems (energy exchange and cycles); man's role as a principle agent of change; environmental impacts; historical perspective including people (ethniciy); and the future environment. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area B2. Crosslisted as HNR/S 319. Fullfills GE B5.

NR 320 Watershed Management and Restoration (4) Hydrologic cycle concepts and measurement. Analysis and measurement of watershed processes. Watershed management including restoration, erosion, and review of forest practice rules. Saturday and/or weekend field trip required. 3 lectures, 1 laboratory. Prerequisite: SS 121, NR/LA 318. Recommended: NR 306.

NR 321 Water Systems Technology, Issues and Impacts (4) GE Area F Sustainable strategies and technologies to enhance freshwater supplies and marine habitats. Systems treated include artificial wetlands, stormwater, drinking water, agricultural and industrial waste water. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B2. Fullfills GE Area F.

NR 322 Human Dimensions in Natural Resources Management (4) GE D5 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. 4 lectures. Prerequisite: Completion of GE Areas A3 and D1. Fullfills GE D5 except for Forestry and Natural Resources majors.

NR 326 Natural Resources Economics and Valuation (4) 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. 3 lectures, 1 activity. Prerequisite: MATH 161 or MATH 221 or equivalent. Recommended: GE Area D2 (ECON 201 recommended), AGB 212.

NR 335 Conflict Management in Natural Resources (4) 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. Prerequisite: NR 141 or NR 142; recommended: PSY 201 or PSY 202.

NR 339 Internship in Forest and Natural Resources (1–12) (CR/NC) 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. Prerequisite: Consent of instructor.

NR 340 Wildland Fire Management (3) 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. Prerequisite: NR 204.

NR 350 Urban Forestry (3) Establishment and management of municipal forests, wildland-urban interface, wildfire 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. Prerequisite: NR 208 or consent of instructor.

NR 351 Introduction to Emergency Management in California (3) 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. Prerequisite: Completion of GE Area B3 or D. Crosslisted as CRP/DMHS/NR 351.

NR 352 Terrorism: Understanding the Threat (3) Theories, procedures, and practices to prepare field responders, first level governmental supervisors and managers in appropriate local emergency operations centers' response to a terrorist incident. 2 lectures, 1 activity. Prerequisite: CRP/DMHS/NR 351. Crosslisted as DMHS/NR 352.

NR 353 Introduction to Crisis Communications and the Media (3) Theories, practices and procedures to educate public and private officials on methods and practices used to communicate with the media in time of local or national disasters or crises. 2 lectures, 1 activity. Prerequisite: CRP/DMHS/NR 351. Crosslisted as DMHS/NR 353.

NR 360 Ethnicity and the Land (4) GE C4 USCP Comparative study of how race and culture shape landscapes, and how social hierarchies allocate the use of natural resources and the burdens of environment pollution. 4 lectures. Prerequisite: Completion of GE Area A and one lower division course in Area C. Recommended: One Ethnic Studies course and an introductory Natural Resources course; junior standing. Crosslisted as ES/N 360. Fullfills GE C4 except for Comparative Ethnic Studies majors. Fullfills USCP.

NR 362 Survey and Management of Mediterranean Ecosystems (4) Woody vegetation found in worldwide Mediterranean ecosystems. Distribution, historical development and uses of these ecosystems. Emphasis on chaparral management techniques and effects of management on fire, water production, biomass potential. 3 lectures, 1 laboratory. Prerequisite: NR 306 or BIO 325 or consent of instructor.

NR 365 Silviculture and Vegetation Management (4) Applied forest ecology and prescriptions for achieving forest ecosystem management; dynamic relations among trees, biological communities, environmental factors, and land use. Vegetation manipulation and reforestation methods. Overnight and/or weekend field trips required. 3 lectures, 1 laboratory. Prerequisite: NR 208 and NR 315.

NR 400 Special Problems for Advanced Undergraduates (2–4) Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of department head.

NR 401 Disaster Recovery (3) 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. Prerequisite: CRP/DMHS/NR 351. Crosslisted as CRP/DMHS/NR 401.

NR 402 Forest Health (4) 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. Prerequisite: NR 208, and NR 306 or BIO 325, or consent of instructor.

NR 404 Environmental Law (3) 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. 3 lectures. Prerequisite: Junior standing. Crosslisted as CRP/NR 404.

NR 405 Managing Sustained Operations (3) Methods and techniques for managing Emergency Management Operations Centers in order to ensure support to local government efforts in rebuilding after a disaster. 2 lectures, 1 activity. Prerequisite: CRP/DMHS/NR 351. Crosslisted as DMHS/NR 405.

NR 408 Water Resource Law and Policy (3) 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. 3 lectures. Prerequisite: Junior standing. Crosslisted as CRP/NR 408.

NR 412 Forest and Natural Resources Senior Assessment Project (3) 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. Prerequisite: NR 326 and completion of GE Area A3 or consent of instructor.
NR 414 Sustainable Forest Management (4)
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 scheduling. Field trips required. 3 lectures, 1 laboratory. Prerequisite: NR 326, NR 365.

NR 416 Environmental Impact Analysis and Management (4)
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. Prerequisite: NR 306 or BIO 325 or equivalent, and NR 335 or consent of instructor.

NR 418 Applied GIS (3)
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. Prerequisite: NR/LA 318.

NR 420 Advanced Watershed Hydrology (4)
Sources of streamflow and processes by which watersheds undergo change from natural and anthropogenic processes. Fluvial processes, sediment transport and channel restoration techniques. Influences of forest and range management on water resources including water quality and analytical techniques. Weekend field trips required. 3 lectures, 1 laboratory. Prerequisite: NR 320 or equivalent or graduate standing.

NR 421 Wetlands (4)
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. Prerequisite: BOT 121 or BIO 162, CHEM 111 or CHEM 127, and SS 121 or SS 131. Recommended: BOT 313, NR 306 or BIO 325. Crosslisted as BIO/SS 421.

NR 425 Applied Resource Analysis and Assessment (4)
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. Prerequisite: NR 416.

NR 432 Disaster Operations Planning (3)
Developing emergency operations plans in support of the local, state and federal emergency management community needs. Major aspects and necessary elements of emergency planning required in a multi-hazard emergency operations plan. 3 lectures. Prerequisite: NR/CRP/DHMIS 351. Crosslisted as DMHIS/NR 432.

NR 434 Wood Properties, Products, and Sustainable Uses (4)
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. Prerequisite: Completion of GE Area B.

NR 435 Natural Resources Policy Analysis (4)
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. Prerequisite: NR 326. Recommended: NR 335.

NR 450 Community Forestry (3)
Development and management of the urban/wildland interface. Socio-economic problems related to forest tree establishment, care, and removal utilization. International implications also covered. Weekend or full-day field trips required. 2 seminars, 1 laboratory. Prerequisite: NR 208 or consent of instructor.

NR 455 Wildland-Urban Interface Fire Protection (3)
Biophysical and socioeconomic issues affecting wildland fire management in urbanized landscapes. Fire risk assessment. Pre-fire prevention, mitigation, and preparation, during-fire response, and post-fire recovery actions by agencies and residents. 2 lectures, 1 laboratory. Prerequisite: NR 340 or consent of instructor.

NR 461, 462 Senior Project I, II (3) (3)
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 180 hours total time.

NR 465 Ecosystem Management (4)
Capstone course that integrates 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. 3 lectures, 1 laboratory. Prerequisite: NR 326 and NR 416 or consent of instructor.

NR 466 Enhanced Exercise Design in Disaster Management (3)
Design, development, evaluation and follow-up of emergency management exercises. Performance based education and skills training for emergency management personnel. 2 lectures, 1 activity. Prerequisite: CRP/DHMIS/NR 351. Crosslisted as CRP/DHMIS/NR 466.

NR 470 Selected Advanced Topics (1–4)
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

NR 471 Selected Advanced Laboratory (1–4)
Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratory. Prerequisite: Junior standing or consent of instructor.

NR 472 Leadership Practice (1)
Leadership styles used in the natural resources management and recreation administration professions. Study and practice in setting goals and objectives; developing, evaluating and implementing an entrepreneurial project plan; decision making and problem-solving. Total credit limited to 4 units. 1 laboratory. Prerequisite: Junior standing or consent of instructor. Crosslisted as NRRP/TA 472.

NR 475 Sustainable Forest and Environmental Practices (15)
Typical modules related to sustainable resource management: ecosystem sampling and inventory methods, photo interpretation, hydrologic resources, road condition, project impact analysis, best management practices. Topics covered vary from term to term depending on the priority for learning modules. Residency at Swanton Pacific and extended field trips required. 10 lectures, 5 activities. Prerequisite: Consent of instructor. Crosslisted as HNRIS/NR 475.

NR 500 Individual Study (1–3)
Advanced independent study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Total credit limited to 4 units. Prerequisite: Consent of instructor.

NR 502 Resource Conservation (3)
Conservation, planning and administration for broad treatment of land, water, mineral, forest, range, and wildlife resources. 3 seminars. Prerequisite: Consent of instructor.

NR 503 Tropical Forest Ecosystem Management (3)
Tropical forest ecosystem classification, function and limitations. Applied tropical forest management systems; tropical problems, management, and political strategies; over-grazing and desertification; overcutting and fuelwood shortages. 3 seminars. Prerequisite: Consent or instructor.

NR 504 Agroforestry Systems (2)
Principles and practical applications of tree crop systems which are managed to provide fuel, fiber, fodder, and food. Tree crop identification and tree product uses. Plantation design, establishment, and cultural practices. Soil management. Integration of forest, and range management practices and values. Special applications to tropical forest ecosystems. 2 lectures. Prerequisite: Consent of instructor.

NR 521 Natural Resources Management for Educators (3)
Philosophy (theoretical and applied) of natural resource management strategies functioning in today's environment. Ecological principles applicable to specific resource components as they relate to the present perception of today's resource base, use demands and projected utilization. Environmental education programs such as Project Learning Tree. 3 seminars. Prerequisite: Consent of instructor.
NR 530  Social Systems in Natural Resources Management (3)
Theories and methods for incorporating community in the management of forest resources. Approaches to conflict resolution between resource owners and community stakeholders using tools such as GIS. 2 lectures, 1 laboratory. Prerequisite: Consent of instructor.

NR 532  Applications in Biometrics and Econometrics (4)
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. Prerequisite: One course in undergraduate statistics, graduate standing, or consent of instructor.

NR 534  Forest Ecosystem Modeling (3)
Methods and modeling approaches used in quantifying ecological processes and conditions associated with forested ecosystems, such as fire behavior, hydrologic processes, terrestrial and aquatic habitat condition using GIS and other models. The Schedule of Classes will list topic selected; sections not repeatable. 2 lectures, 1 laboratory. Prerequisite: One course in undergraduate statistics, graduate standing, or consent of instructor.

NR 539  Graduate Internship in Forest Resources(1–9)
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. Prerequisite: Consent of internship instructor.

NR 570  Selected Topics in Forest Resources (1–4)
Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1–4 seminars. Prerequisite: Consent of instructor.

NR 571  Selected Topics in Forest Resources Laboratory (1–4)
Directed group laboratory of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1–4 laboratories. Prerequisite: Consent of instructor.

NR 575  Applications in Advanced Watershed Hydrology (2)
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. Prerequisite: Consent of instructor. Recommended: NR 420.

NR 581  Graduate Seminar in Forestry and Environmental Sciences (3)
Student study and presentation of selected developments, trends and problems in the field of forest and natural resources. 3 seminars. Prerequisite: Consent of instructor.

NR 599  Thesis (1–9)
Individual research in forest or natural resources management under the general supervision of faculty, leading to a graduate thesis. Degree credit limited to 9 units. Prerequisite: Consent of instructor.