

Forest, Watershed, and Wildland Sciences

GRADUATE

FWWS 501. Research Methods and Planning (2). Methods of inquiry into the ecology and management of forests and wildlands. Review and composition of grant proposals and current literature. Planning and presentation of scientific research. [Open to upper-division students in FWR; required for all FWR graduate students.]

FWWS 690. Thesis Research (1-3). Directed thesis research. [Passing grade of B- required. Rep.]

FWWS 695. Field Research Problems (1-3). Directed individual research on field or laboratory problems. [Passing grade of B- required. Rep.]

FWWS 699. Directed Study (1-4). Individual study. Directed reading, conference, field research, or problems. [Passing grade of B- required. Rep.]

Forestry

LOWER DIVISION

FOR 100. Critical Thinking and Social and Environmental Responsibility (3). How to think critically. Argument identification and evaluation. Formal and informal fallacies. The use of critical thinking methods with application to questions of environmental and social responsibility. Limited to undergraduate students. [A-LD.]

FOR 117. Forestry First Year Seminar (1). Review of current topics in forestry, fire, watershed, or soils. Presentations by speakers and development of professional writing and oral presentation skills. [CR/NC. Rep.]

FOR 130. Dendrology (3). US trees/shrubs. Ranges, botanical characteristics, commercial and noncommercial uses, growth rates, and relation of plants to their total environment. Identify under field conditions and using herbarium specimens. [Weekly: 2 hrs lect, 3 hrs lab.]

FOR 131. Forest Ecology (3). Ecological principles applied to forest management. Production ecology, biogeochemistry, disturbances, environmental factors, populations, community ecology, forest succession, and forest classification/description. [Weekly: 2 hrs lect, 3 hrs lab.]

FOR 170. Conclave: Logging Sports Competition (1). Local or regional logging sports competition. Safe use of traditional and modern forest operations equipment. Does not count towards forestry major. [Rep. CR/NC.]

FOR 210. Forest Measurements & Biometry (4). Surveying including angle and distance measurement, leveling and traverse. Public land survey. Topographic map reading and construction. Tree and forest measurements under field conditions. Forest sampling theory. Introductory statistical analysis of forest measurements. [Prereq: math remediation completed or not required. Weekly: 3 hrs lect, 3 hrs lab.]

FOR 222. Forest Health & Protection (2). Biotic and abiotic disturbance agents. Identification and ecology of important forest insects and diseases of North America. Predisposing factors that increase susceptibility of forests. Management strategies to reduce impacts. [Prereq: FOR 130 or FOR 131. Weekly: 1 hr lect, 3 hrs lab.]

FOR 223. Introduction to Wildland Fire (2). An introduction to the elements of wildland fire behavior; fire management and suppression, and fuels management. History and policy development of forest and rangeland fire management. [Prereq: FOR 130 or FOR 131. Weekly: 1 hr lect, 3 hrs lab.]

FOR 250. Introduction to Forest Operations (3). Overview of forest operations and environmental issues associated with today's forest management practices. Use of mechanized equipment as a tool to meet various forest management objectives. [Prereq: FOR 130 or FOR 131. Weekly: 2 hrs lect, 3 hrs lab.]

UPPER DIVISION

FOR 302. Forest Ecosystems & People (3). Interaction between forest science principles of different forest ecosystems and social expectations and needs. Evolution of how people use the forests of California, from wilderness to city parks. California as the leading edge of forest users. Nonmajors only. [B-UD.]

FOR 307. California's Forests & Woodlands (3). Factors affecting distribution, perpetuation, and health of California's forests and woodlands. Field identification of northern California trees and shrubs. [Prereq: completed area B lower division GE. Weekly: 2 hrs lect, weekend field trips in northern California. B-UD.]

FOR 311. Forest Mensuration & Growth (4). Sampling techniques in forest inventory, timber cruising, and site index determination. Develop volume tables and predict stand growth. Use growth models and computer applications. [Prereq: FOR 130, FOR 210, MATH 105. Weekly: 3 hrs lect, 3 hrs lab.]

FOR 315. Forest Management (3). Managing forest-covered landscapes to meet a variety of objectives by applying economic, sociological, ecological, silvicultural, and operational principles. Nonmajors only. [Weekly: 2 hrs lect, 3 hrs lab.]

FOR 321. Fire Ecology (3). Fire as an ecosystem and physical process. Fire history, fire effects, fire regimes; interactions with abiotic and biotic ecosystem components; managing fire in California bioregions. [Prereq: Course in Ecology or IA. Weekly: 2 hrs lect, 3 hrs lab.]

FOR 323. Wildland Fire Behavior (3). Role of weather, topography, and fuels on fire behavior. Mechanism of ignition and spread of fires. Fire behavior and effects modeling. Objectives, planning, operations, smoke management and post-fire monitoring. [Prereq: FOR 223. Weekly: 2 hrs lect, 3 hrs lab.]

FOR 331. Silvics — Foundation of Silviculture (3). Woody plant interaction with environmental stresses. Factors influencing vigor and growth. Changes to stand structure caused by humans

(thinning, harvesting, fertilization), nature (wind, soil, climate) or time. Selection using genetic principles for improved growth. Seedling production methods in stock types in relation to their effect on morphology/survival. [Prereq: BOT 105, FOR 130, FOR 131, FOR 210 and SOIL 260. Weekly: 2 hrs lect, 3 hrs lab.]

FOR 350. Forest Harvesting Systems (3). Machine operations in ground-based systems, rigging requirements and payload analysis in skyline yarding, helicopter yarding, harvesting planning and unit layout, optimization in transportation planning. [Prereq: FOR 131, FOR 210, FOR 250. Weekly: 2 hrs lect, 3 hrs lab.]

FOR 353. Forest Road Location & Design (3). Road design procedures, standards, and techniques for forest management. Reconnaissance, route surveying, office and field design and location, geometrics, drainage systems, soil engineering, construction sequencing and techniques, erosion control, maintenance. [Prereq: FOR 210, FOR 250, SOIL 260. Weekly: 2 hrs lect, 3 hrs lab.]

FOR 359. CA & US Forest and Wildland Policy (3). US and California government and policies are introduced with an emphasis on the interactions between these institutions and natural resource management. Regulations are analyzed from creation to implementation and interpretation. Meets requirement in "US Constitution and California State and Local Government" established by CA legislature.

FOR 365. Forest Economics and Finance (3). Capital budgeting; benefit/cost analysis; forest appraisal and taxation; welfare economics, management decision making; uncertainty and risk. [Rec: FOR 311 (C). Weekly: 2 hrs lect, 3 hrs lab.]

FOR 374. Wilderness Area Management (3). Paradox of "managing" wilderness; scientific, legislative, philosophical frameworks; managing human use of, and influences on, wilderness. [Weekly: 2 hrs lect; weekend field trips.]


FOR 400. Forestry in Modern Society (3). "Humans are moral creatures" as a model for human integration. Role of professional forestry to serve society and conserve the landscape. Social and environmental reasoning for integrating layers of moral obligation. [E-UD.]


FOR 422. Wildland Fire Use (3). Applying prescribed fire in land management. Fire effects, prescription burning objective, benefits, plans, prescriptions, firing patterns, burn monitoring and evaluation, and smoke management. [Prereq: FOR 321 and FOR 323, or IA. Evening presentations or weekend field trips may substitute for class meeting. Weekly: 2 hrs lect, 3 hrs lab.]


FOR 423. Wildland Fuels Management (3). Managing wildland fuels in forests and rangelands. Advanced understanding of fuel dynamics, management strategies, and challenges facing fuels managers in fire-prone landscapes. Quantitative analysis of the effects of fuels treatments. [Prereq: FOR 223 or IA. Weekly: 2 hrs lect, 3 hrs lab.]


FOR 430. Forest Ecosystems (3). Environmental factors on tree, stand, and landscape dynamics. Investigation at physiological, population,


community, ecosystem, and landscape scales. Analysis of ecological data, scientific writing, and presentation. Extensive field trips in region. [Prereq: FOR 131 or course in ecology. Weekly: 2 hrs lect, 3 hrs lab.]


 **FOR 431. Forest Restoration** (3). Forest restoration at multiple spatial scales from stand to landscape level. Goals for biological conservation, carbon sequestration, economic viability. Restoration techniques and case studies. Managing invasive plant species. [Prereq: FOR 131 or FOR 315 and junior or senior standing.]

 **FOR 432. Silviculture** (4). Theory and practice of controlling forest establishment, composition, and growth. Fundamentals of forest stand development and dynamics. Forest stewardship techniques to satisfy a range of possible objectives (biological, economic, and social). [Prereq: FOR 222, FOR 311 and FOR 331. Weekly: 3 hrs lect, 3 hrs lab.]

 **FOR 450. Harvesting Systems Design & Cost Analysis** (3). Designing integrative harvesting and transportation systems. Computer applications in harvesting cost analysis, equipment purchase and replacement, break-even/sensitivity analysis, statistical analyses and operations research techniques applied to forest operations. [Prereq: FOR 250 and FOR 365. Rec: FOR 350, FOR 353, Weekly: 2 hrs lect, 3 hrs lab.]

 **FOR 471. Forest Administration and Ethics** (3). Policy making; administrative behavior; legislative, regulatory, legal, and ethical considerations as applied to forest management. [Prereq: FOR 250; FOR 311; junior standing or greater. Rec: FOR 432.]

 **FOR 475. Forest Management Decision Making** (3). Social, political, economic, ecological, and silvicultural principles relating to contemporary forestry decision making processes. Predicting forest outcomes, tactical and strategic forest planning sustainability, risk assessment, monitoring and adaptive management. [Prereq: FOR 311 and FOR 365, or IA. Weekly: 2 hrs lect, 3 hrs lab.]

 **FOR 476. Advanced Forest Management** (2). In discussion with land management professionals, students will develop projects on contemporary issues in forest disturbance-based management such as resilience amid a changing climate and management for ecosystem services. [Prereq: Al. Coreq: FOR 432.]

FOR 479. Forestry Capstone (3). A forestry-related project, produced either by a team or by an individual, culminating in a public presentation. [Prereq: must be in final term prior to graduation.]


FOR 480. Selected Topics in Forestry (.5-4). Topics as demand warrants. [Rep.]


FOR 482. Internship (1-3). Students reflect critically upon work experience and report their critical reflections in a written report under faculty guidance. [Prereq: FOR 131 and FOR 210, or IA.]


FOR 490. Senior Thesis (1). Student-designed research project done by a single student with faculty approval before the project is begun. Public presentation of the results and a written paper in journal-ready format. [Prereq: IA.]


FOR 499. Directed Study (1-4). Individual study at upper division level. Conference, directed reading, field research, or problems. [Prereq: IA. Rep.]

GRADUATE

 **FOR 506. Advanced Principles of Remote Sensing & GIS** (3). Forest ecosystem measurements using remote sensing. Spectral signature analysis and computer classification of multispectral data from satellites. Raster data conversion to vector-based geographic information systems. [Prereq: GSP 216 or IA. Weekly: 2 hrs lect, 3 hrs lab. Rep.]

 **FOR 523. Advanced Wildland Fuels Management** (3). Meets jointly with FOR 423. Students enrolled in FOR 523 are expected to carry out additional independent analysis of fuels treatment effects and deliver a lecture on an independent topic. [Prereq: FOR 311 (C) and FOR 323, or IA.]

 **FOR 530. Advanced Forest Ecosystems** (3). Meets jointly with FOR 430. Students enrolled in FOR 530 are expected to carry out additional independent field research projects and deliver a lecture on an independent topic. [Prereq: FOR 131 or IA. Weekly: 2 hrs lect, 3 hrs lab. Rep.]

 **FOR 532. Advanced Principles in Silviculture** (4). Meets concurrently with FOR 432. Students enrolled in FOR 532 are expected to carry out additional independent analyses of silvicultural topics and deliver a lecture on independent topic. [Prereq: IA. Weekly: 3 hrs lect, 3 hrs lab. Rep.]

FOR 680. Advanced Topics in Forestry (.5-4). Topics as demand warrants. [Rep with different topics.]

FOR 685. Forestry Graduate Seminar (1). Review important current literature. [Rep.]