

CH 1223	Chemistry II	3
NREC 4463	Forest Hydrology and Watershed Management	3
FO 4483	Forest Soils	3
Professional Electives ¹		12
Free Electives		6
Total Concentration Hours		35

¹ Electives are selected from the list of electives approved by the Department of Forestry faculty. Students make selections in consultation with their advisor to align electives with the student's interest and career goals.

Natural Resource Technology Concentration (NRT)

Advisor: Krishna Poudel

Modern protocols for natural resource monitoring and management are highly dependent on utilization of spatial technologies such as remote sensing and geographic information systems (GIS). Spatial technologies and allied measurement and quantitative disciplines, combined with general knowledge needed for resource management, are essential in public- and private-sector natural resource professions. Students will also be amply prepared to continue with graduate studies in this area. This Concentration is specifically designed to provide students with the fundamental background to meet the rapidly growing need for professionals who can collect, manage, and manipulate complex geospatial and ancillary data used in natural resource management.

Natural Resource Technology Core Courses		
MA 1323	Trigonometry	3
CH 1043	Survey of Chemistry I	3
or CH 1213	Chemistry I	
FO 2213	Forest Measurements	3
FO 4453	Remote Sensing Applications	0,3
FO 4473	GIS for Natural Resource Management	0,3
Professional Electives ¹		15
Free Electives		5
Total Concentration Hours		35

¹ Electives are selected from the list of electives approved by the Department of Forestry faculty. Students make selections in consultation with their advisor to align electives with the student's interest and career goals.

Courses

FO 1101 Forest Resources Survey: 1 hour.

One hour lecture. Survey of the professional resource manager's role and career opportunities in providing forest-based goods and services. Not open to Forest Resources majors with senior standing

FO 2113 Dendrology: 3 hours.

(Prerequisite: **BIO 1144** or **BIO 2113**). Two hours lecture. Four hours laboratory. Introduction to the identification and systematic classification of trees and other woody plants. Field exercises to promote the recognition and identification of trees and other woody plants

FO 2213 Forest Measurements: 3 hours.

(Prerequisite: **ST 2113** or equivalent). Three hours lecture. Principles of measurement for standing and felled trees. Inventory and sampling theory for forested lands

FO 2443 Essentials of Biotechnology: 3 hours.

Three hours lecture. An introduction to principles and applications of biotechnology. (Same as **CVM 2443**)

FO 2990 Special Topics in Forestry: 1-9 hours.

Credit and title to be arranged. This course is to be used on a limited basis to offer developing subject matter areas not covered in existing courses. (Courses limited to two offerings under one title within two academic years)

FO 3003 Internship in Forestry: 3 hours.

(Prerequisite: Consent of instructor). Professional work experience with firms or companies, non-governmental organizations, government agencies and other relevant entities. May be taken for credit up to four times but only once as a professional elective

FO 3012 Introduction to Forest Communities: 2 hours.

(Prerequisites: **PSS 3303**, **FO 2113**). Field exercises to gain practical knowledge of soil-geology-ecology interrelationships through trips to various physiographic regions

FO 3015 Forest Description and Analysis: 5 hours.

(Prerequisite: **ST 2113** and **FO 2213**). Field and laboratory exercises to gain practical experience with forest and land measurement techniques and equipment. Mapping, inventory, and analysis of forested tracts

FO 3103 Computer Application in Forest Resources: 3 hours.

Two hours lecture. Two hours laboratory. Application of computer concepts in forest resources with emphasis in forestry. Practice and demonstration of general and professional software packages used in upper-level courses and professional settings

FO 3113 Forest Recreation Management: 3 hours.

Three hours lecture. Studies of the management of forest resources for outdoor recreation. (Same as **NREC 3113**)

FO 3203 Forest Fire: 3 hours.

Two hours lecture. Three hours laboratory. Basic aspects of fire history, fire behavior, fire weather, fire effects, and management of fire. Emphasis on the use of prescribed burning in forest management

FO 3213 Tree Physiology: 3 hours.

(Prerequisites: **BIO 1134** and **BIO 1144**). Three hours lecture. Physiological principles (photosynthesis, water relations and nutrient uptake) in the context of the unique physical attributes of trees including their large multi-dimensional crowns, long distance transport systems, woody stems, and longevity

FO 4000 Directed Individual Study in Forestry: 1-6 hours.

Hours and credits to be arranged

FO 4113 Forest Resource Economics: 3 hours.

(Prerequisites: **AEC 2713** or equivalent). Three hours lecture. Basic principles of forest resource valuation; economics applied to production, conversion, marketing and consumption of forest products and benefits

FO 4123 Forest Ecology: 3 hours.

(Prerequisite **BIO 1144** or **BIO 2113** or equivalent AND Junior standing; OR consent of instructor). Three hours lecture. Natural principles governing establishment, development, and functioning of forest ecosystems. Includes ecology, genetics, physiology, tree growth, reproduction, site, stand dynamics, energetics, hydrology, nutrition, and succession

FO 4203 Fundamentals of Forest Business Data Analysis and Visualization: 3 hours.

Three hours lecture. Basic principles of spreadsheet operations, worksheet management, formula integration, data analysis, and report building in forestry and natural resource management with emphasis on forest business applications

FO 4213 Forest Biometrics: 3 hours.

(Prerequisite: **FO 2213** or **NREC 3213**). Three hours lecture. Applications of mensurational and statistical principles and techniques in determination of forest growth and yield. Advanced topics of forest resource inventory

FO 4221 Practice of Silviculture Laboratory: 1 hour.

(Prerequisite: **FO 3012**, **FO 3015**, **FO 4123/6123** or (**WFA 3133** and **WFA 4223**) or consent of instructor; co-requisite: **FO 4223/6223**). Four hours laboratory. Application of silvicultural practices and operations under given forest land management objectives

FO 4223 Practice of Silviculture: 3 hours.

(Prerequisite: **FO 3012**, **FO 3015**, **FO 4123/6123** or (**WFA 3133** and **WFA 4223**) or consent of instructor; co-requisite: **FO 4221/6221**). Three hours lecture. Manipulation to obtain desired reproduction and to attain optimum development under given forest land management objectives

FO 4231 Introduction to Wood Supply Systems: 1 hour.

(Co-requisite: **FO 3015**). Investigative field and laboratory exercises used to gain practical knowledge into the structure and performance of wood supply systems

FO 4233 Forest Operations and Harvesting: 3 hours.

(Prerequisites: **FO 4231/6231**). Three hours lecture. Study of practical, managerial, and logistic considerations associated with harvesting and other forest operations, as well as their social, environmental, and legal influences

FO 4253 Timber Procurement: 3 hours.

(Prerequisites: **FO 4233/6233**). Lectures and field exercises dealing with the problems of timber procurement to include planning for harvest, methods of handling and transport, legal and safety considerations

FO 4313 Spatial Technologies in Natural Resources Management: 3 hours.

(Prerequisite: **FO 3015** or **GR 2313**). Three hours lecture. Three hours laboratory. Fundamentals of scale, area, height, and stand volume determinations from aerial imagery; planimetric and topographic mapping; image interpretation; GPS and GIS; applications to natural resources. (Same as **NREC 4313**)

FO 4323 Forest Resource Management: 3 hours.

(Prerequisites: **FO 4113/6113**, **FO 4223/6223**, **FO 4233/6233**, **FO 4231/6231**, **FO 4213/6213**). Three hours lecture. Three hours laboratory Application of quantitative decision making techniques to stand-level and forest-wide management problems. Topics include land classification, forest production, optimal rotation analysis, and harvest scheduling

FO 4343 Forest Administration and Organization: 3 hours.

(Prerequisite: Junior standing). Three hours lecture. Hierarchy and land structuring of forest organizations. Legal aspects of administering forest land holdings

FO 4353 Natural Resource Law: 3 hours.

(Prerequisite: Junior standing). Three hours lecture. A comprehensive study of the laws relating to natural resources and forestry with emphasis on tort law, property law, environmental law, taxation law, and contract law. (Same as **NREC 4353**)

FO 4403 Intermediate Forest Business Data Analysis and Visualization: 3 hours.

Three hours lecture. Concepts and applications related to forest business data analysis, mapping, and visualization in the context of forestry and natural resource management

FO 4411 Remote Sensing Seminar: 1 hour.

(Prerequisites: Junior Standing). One hour lecture. Lectures by remote sensing experts from industry, academia, and governmental agencies on next-generation systems, applications, and economic and societal impact of remote sensing. May be repeated for credit up to four credits. (Same as **PSS 4411/6411**, **ECE4411/6411**, **GR 4411/6411**)

FO 4413 Natural Resources Policy: 3 hours.

(Prerequisite: Senior standing). Three hours lecture. Current topics relating to natural resources policy which affect management decisions and practices in the public and private sectors of natural resources use. (Same as **NREC 4413**)

FO 4423 Professional Practice: 3 hours.

(Prerequisite: **FO 4323/6323**) Three hours lecture. Four hours laboratory. Forest resource data collection and analysis. Development of forest resource alternatives and recommendations for a specific forest property

FO 4453 Remote Sensing Applications: 3 hours.

(Prerequisite: **FO 3015** or **GR 2313**). Two hours lecture. Three hours laboratory. An introduction to remote sensing with emphasis on analysis and application of digital image data in inventory, monitoring, and management of renewable natural resources

FO 4463 Forest Hydrology and Watershed Management: 3 hours.

(Prerequisite: **PSS 3303**). Three hours lecture. Synthesis of current information on the fundamental properties and processes of forest soils, hydrology, and water quality with emphasis on watershed and ecosystem management factors. (Same as **NREC 4463**)

FO 4473 GIS for Natural Resource Management: 3 hours.

(Prerequisite: **FO 3015** or **GR 2313**). Two hours lecture and three hours laboratory. Introduction to geographic information systems (GIS) with emphasis on collection, encoding, storage, retrieval, and analysis of spatial data for use in management of natural resources

FO 4483 Forest Soils: 3 hours.

(Prerequisite: **PSS 3303**). Three hours lecture. Synthesize current information on fundamental properties and processes of forest soils with emphasis on applications to silviculture, soil conservation, and sustainable management of forested ecosystems

FO 4513 Forestry and Conservation for Educators.: 3 hours.

(Two hours lecture; two hours lab). Importance of forestry and natural resources conservation, application of forestry and conservation principles and practices to educational settings. For non-forestry majors

FO 4573 Ecology of Managed Forests: 3 hours.

(Prerequisite: Graduate standing, upper-level FO undergraduate student, or consent of instructor). Three hours lecture. Examination of the ecological factors that influence silvicultural practice in North America. (Same as **NREC 4573**)

FO 4663 Consulting Forestry: 3 hours.

(Prerequisite: FO major, senior or graduate standing and consent of instructor). Three hours lecture. Review of business, legal, and economic issues integral to applying the science of forestry as a service based enterprise

FO 4683 Introduction to Urban and Community Forestry: 3 hours.

Prerequisite: Sophomore Standing. Three hours lecture. Addresses urban forest management issues and opportunities as well as educational extension/outreach program strategies within the urban forest context. (Same as **NREC 4683**)

FO 4703 Forest Business Location Analytics and Intelligence: 3 hours.

Three hours lecture. Analysis of spatially enabled data to facilitate forest business location and natural resource management decisions

FO 4771 Seeing the Forest for the Trees: A Career Exploration: 1 hour.

One hour lecture plus laboratory experience. A course for upper-level, non-Forestry majors providing an overview of forest management, wood products, manufacturing facilities, and career opportunities for non-foresters

FO 4800 Undergraduate Research in Forestry: 13 hours.

Hours, credits and deliverables to be arranged. The purpose of this course is to provide a student with the opportunity to participate in research and/or creative project beyond the traditional undergraduate experience

FO 4990 Special Topics in Forestry: 1-9 hours.

Credit and title to be arranged. This course is to be used on a limited basis to offer developing subject matter areas not covered in existing courses. (Courses limited to two offerings under one title within two academic years)

NREC 1102 Survey of Natural Resource Management: 2 hours.

Two hours lecture. Orientation to the multidisciplinary aspects of natural resource conservation and management, orientation to the department, college, and university; understanding of student roles and responsibilities; and introduction to career opportunities

NREC 2990 Special Topics in Natural Resource & Envir Cons: 1-9 hours.

Credit and title to be arranged. This course is to be used on a limited basis to offer developing subject matter areas not covered in existing courses. (Courses limited to two offerings under one title within two academic years)

NREC 3113 Forest Recreation Management: 3 hours.

Studies of the management of forest resources for outdoor recreation. (Same as **FO 3113**)

NREC 3213 Environmental Measurements: 3 hours.

(Prerequisite: **PSS 3303**, **ST 2113** or equivalent). Two hours lecture. Three hours laboratory. Principles of inventory, sampling and analysis for measurements in environmental assessments. Field exercises provide practice in sampling methods, data collection, instrumentation, and analysis

NREC 4000 Directed Individual Study in Forestry: 1-6 hours.

Hours and credits to be arranged

NREC 4313 Spatial Technologies in Natural Resources Management: 3 hours.

(Prerequisite: **FO 3015** or **GR 2313**). Three hours lecture. Three hours laboratory. Fundamentals of scale, area, height, and stand volume determinations from aerial imagery; planimetric and topographic mapping; image interpretation; GPS and GIS; applications to natural resources. (Same as **FO 4313**)

NREC 4333 Ecological Risk Assessment and Chemical Regulation: 3 hours.

(Prerequisites: **CH 1043** or **CH 1213**, **BIO 1144**; or graduate standing). Three hours lecture. Principles of assessing ecological effects, exposure, and risk characterization of chemical contaminants in the environment; regulatory framework for mitigating risk of chemical hazards in the environment; preparation of Ecological Risk Assessments (ERAs)

NREC 4353 Natural Resource Law: 3 hours.

Three hours lecture. A comprehensive study of the laws relating to natural resources and forestry with emphasis on tort law, real property law, environmental law, taxation law and contract law. (Same as **FO 4353**)

NREC 4413 Natural Resource Policy: 3 hours.

Three hour lecture. Current topics relating to natural resources policy which affect management decisions and practices in the public and private sectors of natural resources use. (Same as **FO 4413**)

NREC 4423 Environmental Assessment: 3 hours.

(Prerequisite: NREC senior level standing or consent of instructor). Two hours lecture. Two hours laboratory. Principles of assessing environmental impacts resulting from planned management activities affecting natural resources. Preparation of an Environmental Assessment (EA)

NREC 4463 Forest Hydrology and Watershed Management: 3 hours.

(Prerequisite: **PSS 3303**). Three hours lecture. Synthesis of current information on the fundamental properties and processes of forest soils, hydrology, and water quality with emphasis on watershed and ecosystem management factors. (Same as **FO 4463**)

NREC 4573 Ecology of Managed Forests: 3 hours.

Three hours lecture. Examination of the ecological factors that influence silvicultural practice in North America. (Same as **FO 4573**)

NREC 4683 Introduction to Urban and Community Forestry: 3 hours.

Prerequisite: Sophomore Standing. Three hours lecture. Addresses urban forest management issues and opportunities as well as educational extension/outreach program strategies within the urban forest context. (Same as **FO 4683**)

NREC 4733 Climate Change Resilience in Natural Resources: 3 hours.

(Prerequisites: Junior standing). Three hours lecture. Explore methods of building resilience to climate change in human-managed ecological systems. Assess climate change vulnerabilities, adaptive measures, and the necessary elements of building resilient systems, including nature-based, policy-based, and technological approaches. Develop climate adaptation and resilience plans

NREC 4800 Undergraduate Research: 13 hours.

The purpose of this course is to provide a student with the opportunity to participate in research and/or creative project beyond the traditional undergraduate experience, while allowing the university to track undergraduate participation in these activities. Hours, credits and deliverables to be arranged

NREC 4990 Special Topics in Natural Resource & Environmental Conservation: 1-9 hours.

Hours and credit to be arranged

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