# FORESTRY FOR

## Department of Forestry
## College of Agriculture and Natural Resources

**101 Michigan's Forests**
Spring. 3(3-0)
Ecological, social and economic roles of Michigan's forests in historic and contemporary context. Geographic similarities and differences in forest resources.

**202 Introduction to Forestry**
Fall, Spring. 3(3-0)
Historical development of forestry. Forest growth, protection, management, and products. Relationship of national and world economy and policy to forestry. Emphasis on multiple uses of forests.

**204 Forest Vegetation**
Fall. 4(3-3)
Nomenclature, classification, and identification of woody plants. Tree structure as it relates to growth and ecosystem dynamics.

**211 Introduction to Gender and Environmental Issues**
Spring. 3(3-0) Interdepartmental with Environmental Economics and Policy and Environmental Studies and Applications and Fisheries and Wildlife and Women's Studies. Administered by Fisheries and Wildlife. R: Not open to freshmen.
The concept of gender. Overview of environment and habitat. Historical gender roles in environmental management. Gender-based theoretical perspectives. Case studies on developing and developed countries. Environmental management with emphasis on fisheries, wildlife and wetlands. Women environmental professionals.

**220 Forests and the Global Environment**
Fall. 3(3-0)
Relationships between forests, climatic and edaphic factors, and human influences upon forest resources. Deforestation, biodiversity, sustainable forest management and timber trade.

**304 Wood Technology**
Fall. 4(3-2) P: CEM 141 R: Not open to freshmen or sophomores.
Structure and identification of wood. Physical and mechanical characteristics. Major industrial timber utilization processes including manufacture of lumber, furniture, composites, and paper.

**305 Wood Composites**
Spring. 3(2-2) P: CEM 141 or CEM 151 or CEM 181H
Physical and chemical principles of wood adhesion. Wood gluing. Wood adhesives and their properties. Manufacturing principles of wood-based composites. Composite design, process unit operations, property evaluation, and applications. New wood-based composite developments.

**306 Forest Biometry**
Spring. 4(3-2) P: MTH 116 or MTH 124 or MTH 132 or LBS 118 RB: FOR 204 R: Not open to freshmen or sophomores.
Describing location and area of forest resources. Quantification of site, stand, and tree characteristics. Sampling and inventory. Predicting growth and yield.

**307 Lumber Manufacturing and Processing**
Spring. 3(3-0) P: FOR 304 or approval of department R: Open to undergraduate students in the Forestry major.
Quality factors that influence the conversion of logs into lumber. Field trips required.

**308 Forest Science Research Seminar**
Spring. 2(2-0) P: Completion of Tier I Writing Requirement R: Open to juniors or seniors in the Forestry major. Approval of department.
Epistemology, scope, and methodology of disciplines within forestry. Research ethics. Design and analysis of research projects.

**330 Social Applications in Forestry**
Spring. 2(2-0) P: ISS 210 or ISS 215 or ISS 220 or ISS 225
Social factors underlying forest resource management issues. Public values, attitudes, knowledge, and behavior with respect to forests. Public participation, conflict resolution, and communicating forestry issues.

**393 Forest Products Internship**
Summer. 2 credits. RB: FOR 304 or FOR 305 R: Open only to juniors in the Forestry major.
Pre-professional educational employment experience in forest products industry, government, or public agency.

**400 Forest Harvest Operations**
Spring. 2(1-2) P: CSS 210 and FOR 404 and ((MTH 124 or concurrently) or (MTH 132 or concurrently)) RB: FOR 406 and FOR 420 R: Open only to juniors or seniors.
Forest harvest systems, components and equipment, non-timber products, and road and transport planning. Soil, slope, riparian and wetland limitations. Erosion prediction and control. Harvest contracting and best management practices.

**404 Forest and Agricultural Ecology**
Fall. 3(3-0) Interdepartmental with Crop and Soil Sciences. Administered by Forestry. P: CSS 210 and (BOT 105 or BS 110) RB: ZOL 355
Ecological interactions crucial to the sustainable management of crop and forest ecosystems. Plant resources, competition, community development and dynamics, biodiversity, primary productivity, nutrient cycling, ecosystem structure and function, and impacts of global environmental change.

**404L Forest and Agricultural Ecology Laboratory**
Fall. 1(0-3) Interdepartmental with Crop and Soil Sciences. Administered by Forestry. P: CSS 210 and (BOT 105 or BS 110) and (FOR 404 or concurrently) RB: ZOL 355
Field studies and data analysis of ecological processes central to the sustainable management of forest and agricultural resources. Field exercises cover primary production, community structure, soil resources, biodiversity, succession, nutrient cycling, critiques of primary literature. Two weekend field trips required.

**406 Silviculture**
Spring. 4(3-3) P: FOR 204 and FOR 404 R: Not open to freshmen or sophomores.
Ecophysiology of tree growth and reproduction. Stand structure, composition and growth. Intermediate stand treatments. Natural and artificial reproduction. Silvicultural techniques.

**408 Forest Resource Management**
Fall. 3(2-2) P: FOR 406 and (FOR 464 or concurrently) RB: Forestry major.
Management of forests to sustain ecological, economic, and social values. Management and administration of forestry organizations. Timber production in multiple-use and ecosystem management contexts.

**410 Forest Science Thesis (W)**
Fall, Spring. 3(3-0) P: Completion of Tier I writing requirement. RB: FOR 308 R: Open to seniors in the Forestry major.
Selecting, researching, and evaluating a forest science issue and communicating findings in a thesis and a departmental seminar.

**412 Wildland Fire**
Fall. 2(2-0) P: FOR 404 or ZOL 355
Fire in wildland forest and grassland communities as a physical and ecological process. Fire history, culture, and management. Global perspectives, strategies for prevention and suppression of wildfires. Techniques for using prescribed fire.

**415 Forest Products Marketing**
Spring. 2(2-0) P: EC 201 or EC 202
Global marketing of forest products. Domestic and international marketing, trade patterns and policies, resource base dynamics, pricing strategy, and marketing techniques.

**419 Applications of Geographic Information Systems to Natural Resources Management**
Spring. 4(2-4) Interdepartmental with Community, Agriculture, Recreation and Resource Studies and Biosystems Engineering and Fisheries and Wildlife and Geography. Administered by Fisheries and Wildlife. P: GEO 221
Application of geographic information systems, remote sensing, and global positioning systems to integrated planning and management for fish, wildlife, and related resources.

**420 Forestry Field Studies**
Spring. 3 credits. P: FOR 306 and FOR 406 R: Open only to juniors or seniors in the College of Agriculture and Natural Resources.
Ecological and silvicultural assessments and planning for multiple uses of forest lands. Forest management concepts including soils, biometry, harvesting and protection.

**430 Environmental and Natural Resource Law**
Fall. 3(3-0) Interdepartmental with Environmental Economics and Policy and Environmental Studies and Agriscience. Administered by Environmental Studies and Agriscience. P: ESA 200 or EEP 255 or approval of department R: Open to juniors or seniors or graduate students. SA: RD 430
Legal principles applied to the environment and natural resources. Sovereignty, property rights, land and water use, jurisdiction, public trust doctrine, wetland law, and eminent domain. Case and statutory law analysis.

**441 Plant Breeding and Biotechnology**
Spring of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Horticulture. Administered by Crop and Soil Sciences. P: CSS 101
Plant improvement by genetic manipulation. Genetic variability in plants. Traditional and biotechnological means of creating and disseminating recombinant genotypes and cultivars. Importance of plant breeding to our food system, economy, and environment.

**450 Forestry in International Development**
Fall. 3(3-0) Interdepartmental with Sociology. Administered by Forestry. RB: FOR 404 R: Open only to seniors or graduate students.
Biophysical, social and economic factors influencing design and implementation of farm, village and community level forestry and agroforestry projects.

**451 Biotechnology Applications for Plant Breeding and Genetics**
Spring. 3(2-2) Interdepartmental with Crop and Soil Sciences and Horticulture. Administered by Crop and Soil Sciences. RB: (CSS 350 or ZOL 341) and CSS 441
Principles, concepts, and techniques of agricultural plant biotechnology. Recombinant DNA technology, plant molecular biology and transformation in relation to plant improvement.

**452 Watershed Concepts**
Fall, Spring, Summer. 3(3-0) Interdepartmental with Biosystems Engineering and Crop and Soil Sciences and Environmental Studies and Agriscience and Fisheries and Wildlife. Administered by Environmental Studies and Agriscience. P: ESA 324 and ZOL 355 RB: organic chemistry SA: RD 452
Watershed hydrology and management. The hydrologic cycle, water quality, aquatic ecosystems, and social systems. Laws and institutions for managing water resources.

**461 Urban Forestry**
Spring. 3(3-0) P: FOR 204 or HRT 211 R: Not open to freshmen or sophomores.
Trees in improving the urban environment. Principles of urban forest management: legal, economic, organizational, and cultural. Street tree planning and inventory systems. Utility forestry and commercial arboriculture. Field Trips required.

**464 Forest Resource Economics (W)**
Fall. 3(2-2) P: (EC 201 or EC 202) and completion of Tier I writing requirement. R: Not open to freshmen or sophomores.
Basic economic principles that govern human use and production of forest resources. Application of financial and economic analysis techniques to forest resource allocation.

**466 Natural Resource Policy**
Spring. 3(3-0) Interdepartmental with Fisheries and Wildlife and Park, Recreation and Tourism Resources and Resource Development. Administered by Forestry. R: Not open to freshmen or sophomores.
Natural resources policy-making in the context of scientific, environmental, social, and legal-institutional factors. Historical evolution of policies and case studies of contemporary policy issues.

**467 BioEnergy Feedstock Production**
Fall. 3(3-0) Interdepartmental with Biosystems Engineering and Crop and Soil Sciences. Administered by Crop and Soil Sciences. P: MTH 103 or MTH 116 RB: CSS 101 and CSS 210
Agronomic, economic, technological, and environmental principles involved in bioenergy feedstock production. Cultivation, harvest, transportation, and storage of agricultural and forest biomass.

**478 Pest Management II: Biological Components of Management Systems (W)**
Spring of even years. 3(2-3) Interdepartmental with Crop and Soil Sciences and Entomology and Fisheries and Wildlife and Horticulture. Administered by Entomology. P: (ENT 404 or ENT 470 or PLP 405 or CSS 402) and completion of Tier I writing requirement
Principles of host plant resistance and biological control and their relationship to the design of agroecosystems. Classification of insect biological control agents.

**480 Woody Plant Physiology**
Spring. 3(3-0) Interdepartmental with Horticulture. Administered by Horticulture. P: PLB 105 or BS 110 R: Not open to freshmen or sophomores.
Physiology of carbon utilization. Effects of water, temperature, nutrition, and light on apical, vegetative, and reproductive growth of woody plants.

**486 Biotechnology in Agriculture: Applications and Ethical Issues**
Fall of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Horticulture and Philosophy. Administered by Horticulture. P: BOT 105 or BS 111 RB: CSS 350 or ZOL 341 R: Not open to freshmen or sophomores.
Current and future roles of biotechnology in agriculture: scientific basis, applications. Environmental, social, and ethical concerns.

**490 Independent Study in Forestry**
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to juniors or seniors. Approval of department.
Special problems course for students qualified for advanced study in some phase of forestry.

**802 Forest Science Research**
Fall. 2 credits.
The philosophy, nature, and procedures of research in the forestry sciences.

**804 Forest Ecology**
Fall of odd years. 3(3-0) RB: FOR 404
Processes controlling population, community, ecosystem, landscape, and global ecology of forested systems. Extrapolation across scales, succession, spatial models of forest dynamics, causes and consequences of biodiversity, nutrient cycling, sustainability of managed ecosystems and human-accelerated environmental change.

**819 Advanced Plant Breeding**
Fall of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Horticulture. Administered by Horticulture. RB: STT 422 and ZOL 341
Genetic expectations resulting from breeding strategies with cross- and self-pollinated crop plants. Germplasm collections, mapping populations, and modifications of reproductive biology useful for crop improvement.

**820 Plant Reproductive Biology and Polyploidy**
Spring of odd years. 1(3-0) Interdepartmental with Crop and Soil Sciences and Horticulture and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology
Genetic processes underlying variations in plant reproductive biology and polyploidy. Utilization of these characteristics in plant breeding.

**821 Crop Evolution**
Spring of odd years. 1 credit. Interdepartmental with Crop and Soil Sciences and Horticulture and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology
Cultural and biological aspects of the evolution of domestic plants.

**822 Historical Geography of Crop Plants**
Spring of odd years. 1 credit. Interdepartmental with Crop and Soil Sciences and Horticulture and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology
Development and spread of the major crop species.

**824 Forest Soils**
Fall of even years. 3(2-2)
Evaluation and inventory of forest soils and landscape ecosystems. Physical, biological, and chemical processes. Nutrient cycling, diagnosis, and fertilization. Variability, geography, and landscape ecology.

**826 International Development Theory and Practice**
Fall. 3(3-0) Interdepartmental with Community, Agriculture, Recreation and Resource Studies and Anthropology and Political Science and Social Science. Administered by Community, Agriculture, Recreation and Resource Studies. SA: RD 826
Evolution of international development theory across disciplines. Changing conceptualizations, measurements, processes and effects of development and poverty. Ethnicity, social class, gender, and community influences on socioeconomic processes. Current issues, concerns, and strategic alternatives.

**829 The Economics of Environmental Resources**
Spring. 3(3-0) Interdepartmental with Community, Agriculture, Recreation and Resource Studies and Agricultural Economics and Economics and Fisheries and Wildlife and Park, Recreation and Tourism Resources. Administered by Agricultural Economics. RB: Graduate Status
Economic principles related to environmental conflicts and public policy alternatives. Applications to water quality, land use, fish and wildlife, conservation, development, and global environmental issues.

**842 Population Genetics, Genealogy and Genomics**
Fall. 3(3-0) Interdepartmental with Animal Science and Crop and Soil Sciences and Fisheries and Wildlife and Genetics and Horticulture. Administered by Forestry. RB: Pre-calculus, basic genetics
Population genetic processes underlying patterns of molecular genetic variation. Genealogical approaches to the study of genomic diversity, phylogenetic reconstruction, and molecular ecology.

**852 Systems Modeling and Simulation**
Fall of even years. 3(3-0) Interdepartmental with Biosystems Engineering and Fisheries and Wildlife and Resource Development. Administered by Fisheries and Wildlife. RB: STT 422 or STT 442 or STT 464 or GEO 463
General systems theory and concepts. Modeling and simulation methods. Applications of systems approach and techniques to natural resource management, and to ecological and agricultural research.

**853 Applied Systems Modeling and Simulation for Natural Resource Management**
Spring of odd years. 3(2-2) Interdepartmental with Biosystems Engineering and Fisheries and Wildlife and Resource Development and Zoology. Administered by Fisheries and Wildlife. RB: (FW 820 or BE 486 or ZOL 851) or or approval of department. R: Open only to seniors and graduate students
Mathematical models for evaluating resource management strategies. Stochastic and deterministic simulation for optimization. System control structures. Team modelling approach.

**858 Gender, Justice and Environmental Change : Issues and Concepts**
Fall. 3(3-0) Interdepartmental with Anthropology and Environmental Studies and Applications and Fisheries and Wildlife and Geography and Sociology. Administered by Fisheries and Wildlife. RB: Background in social science, environmental science, or natural resources.
Issues and concepts related to gender, ecology, and environmental studies. Key debates and theoretical approaches to addressing environmental issues from a gender and social justice perspective. Gender and environment issues and processes from a global perspective.

**859 Gender, Justice, and Environmental Change: Methods and Application**
Spring of even years. 3(3-0) Interdepartmental with Anthropology and Fisheries and Wildlife and Geography and Resource Development and Sociology. Administered by Anthropology. RB: Background in social science, environmental science, or natural resources.
Methods and case studies related to gender, ecology, and environmental studies. Methodological and fieldwork issues from a feminist perspective in international and intercultural contexts. Qualitative and quantitative methods for integrating social and environmental data.

**866 Economics of Renewable Resources**
Spring of odd years. 3(2-2) Interdepartmental with Resource Development. Administered by Forestry. RB: AEC 829 or EC 803 or EC 805
Applications of economic theory and analysis to renewable natural resources problems. Focus on renewable resource interactions, including multiple-use forestry and agroforestry.

**870 Techniques of Analyzing Unbalanced Research Data**
Spring. 4(4-0) Interdepartmental with Animal Science and Crop and Soil Sciences and Fisheries and Wildlife and Horticulture. Administered by Animal Science. RB: STT 464 R: Open only to graduate students in the College of Agriculture and Natural Resources. SA: ANS 943
Linear model techniques to analyze biological research data characterized by missing and unequal number of observations in classes. Simultaneous consideration of multiple factors. Prediction of breeding values and estimation of population parameters from variance and covariance components.

**872 Parks and Protected Areas Policy and Management**
Spring of even years. 3(3-0) Interdepartmental with Community, Agriculture, Recreation and Resource Studies. Administered by Community, Agriculture, Recreation and Resource Studies. SA: PRR 842
Historical and institutional approach to national park and wilderness policies. Variations in policy implementation across United States natural resource management agencies. International protected areas policies and issues. Relationship between policy and resource management.

**885 Leadership in Natural Resources and Environmental Management**
Fall of even years. 3(3-0) Interdepartmental with Agricultural Economics and Fisheries and Wildlife and Park, Recreation and Tourism Resources. Administered by Fisheries and Wildlife.
Theory and practice of leadership in natural resource and environmental management. Integration across disciplinary and jurisdictional divisions.

**890 Special Problems**
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 7 credits in all enrollments for this course. R: Approval of department; application required.
Advanced individual study in an area of forestry.

**891B Selected Topics in Plant Breeding and Genetics**
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Crop and Soil Sciences and Horticulture. Administered by Horticulture. R: Open only to graduate students in the Plant Breeding and Genetics major or Genetics major. Approval of department.
Selected topics in plant breeding.

**892 Plant Breeding and Genetics Seminar**
Fall, Spring, Summer. 1(1-0) A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Crop and Soil Sciences and Horticulture. Administered by Horticulture.
Experience in review, organization, oral presentation, and analysis of research.

**899 Master's Thesis Research**
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
Master's thesis research.

**923 Advanced Environmental and Resource Economics**
Fall. 3(3-0) Interdepartmental with Agricultural Economics and Economics and Park, Recreation and Tourism Resources and Resource Development. Administered by Agricultural Economics. RB: AEC 829 and EC 812A
Advanced economic theory of environmental management and policy. Treatment of externalities and market and non-market approaches to environmental improvement. Topics in conservation and sustainable economic growth. Applications to research and policy.

**925 Advanced Natural Resource Economics**
Spring. 3(3-0) Interdepartmental with Agricultural Economics and Economics and Park, Recreation and Tourism Resources and Resource Development. Administered by Agricultural Economics. RB: EC 812A and AEC 829 and FOR 866 SA: AEC 991H
Economic theory of managing nonrenewable and renewable resources, including optimal use, the incentives for use under decentralized markets, and public policy design. Analysis of the co-evolution of economic and ecological systems.

**941 Quantitative Genetics in Plant Breeding**
Spring of even years. 3(2-2) Interdepartmental with Crop and Soil Sciences and Horticulture. Administered by Crop and Soil Sciences. RB: CSS 819 and STT 464
Theoretical and genetic basis of statistical analysis of quantitative traits using genetic markers. Computational tools for the study of quantitative traits.

**999 Doctoral Dissertation Research**
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students in the Department of Forestry.
Doctoral dissertation research.