

Department of Forest and Natural Resources Management

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The Department of Forest and Natural Resources Management (FNRM) offers programs leading to bachelor's, master's and doctoral degrees at the main college campus in Syracuse, N.Y., and three programs leading to the associate in applied science (A.A.S.) degree at The Ranger School in Wanakena, N.Y. See The [Ranger School](#) section for information about the associate of applied science degrees in forest technology, land surveying technology, and environmental and natural resources conservation.

Faculty

ABDEL-AZIZ (Applied Mathematics), BEIER (Forest Ecology, Regional Analysis), BEVILACQUA (Forest Measurements, Statistics), BRIGGS (Forest Soils, Silviculture), CONAHAN (Applied Mathematics), GERMAIN (Sustainable Forestry Systems, Forest Operations), KUEHN (Recreation Resources Management and Tourism), LAVIE (Applied Mathematics), MALMSHEIMER (Forest and Natural Resources Law and Policy), MAYNARD (Tree Improvement, Plant Tissue Culture and Transformation), MORRISON (Resource Sociology and Urban Forestry), NEWMAN, Chair (Forest Resource Economics and Policy), C. NOWAK (Vegetation Management, Sustainable Forest Management, Silviculture), NYLAND (Silviculture and Forest Management), STEHMAN (Statistics, Environmental Sampling), STELLA (Watershed Management), VIDON (Hydrology, Biogeochemistry), VOLK (Woody Biomass Energy), VONHOF (Natural Resources History), WAGNER (Forest Resource Economics, Business), YANAI (Forest Soils, Ecosystem Nutrient Cycling, Simulation Modeling), ZHANG (Biometrics, Quantitative Silviculture)

Adjunct Faculty:

BENZEL, BICK, BURNS, CASTRO, COLLINS, CULKOWSKI, R. DAVIS, HEISLER, KELLEHER, LAUTZ, D. NOWAK, PAVESE, PEREZ, ROBISON, SCHUSTER, SMITH, STOUT, D. WHITE, WOOD, WIELOPOSKI

Mission and Vision

ESF's forest and natural resources management programs are science-based and values-driven. The integration of values and scientific facts characterize professions that are successful in democracies. ESF-trained foresters and natural resource managers are able to integrate these two threads in America's complex society.

The mission of ESF forest and natural resources management programs is to produce knowledge and transmit it to our customers; encourage continual learning about forest and related renewable resources and their role in making people's lives better; and develop leaders who will manage renewable resources on a sustainable basis.

The Department's vision of professional forest and natural resource managers is that they are problem solvers who master disciplinary knowledge and skills, then integrate them to protect and manage forest and natural resources; and leaders who help people solve the more complex problems with the world's forest and natural resources.

ESF forest and natural resources management's educational goals are to:

- Understand forests and related natural resources — how they function and their dynamics;
- Be skilled in managing forests and other natural resources and predicting the consequences;
- Monitor citizen and owner values of forests and other natural resources and be respectful of them; and
- Integrate values with scientific facts and know the limits of our knowledge.

Undergraduate Programs

The forest and natural resources management programs prepare students for work with public and private sector organizations and consultancies and for further professional or scientific study at the graduate level. Students develop professional skills, which employers look for in new employees:

- Management skills including leadership, communication abilities, and teamwork;
- Scientific knowledge and technical skills in measurements and analysis for management;
- The ability to analyze and solve resource management problems using both social and biophysical sciences; and
- A clear understanding of ethics and stewardship.

These skills are best developed by a broad base in the social sciences and humanities, communication, the natural sciences, and quantitative and qualitative methods. The majority of coursework taken during the first two years (lower division) is in these basics.

Students are required to complete general education requirements and a professional core. Forest resources management students may concentrate some of their technical electives. Natural resources management majors have a ready opportunity to earn a minor in an area of disciplinary interest.

Bachelor of Science in Forest Resources Management

Professional forestry education has been featured at ESF since the College's founding in 1911. Today's forest resources management program is based on a clear vision that combines professional competency with a strong foundation in the biophysical sciences, humanities, and social sciences to meet society's needs for forest managers.

Many ESF students enjoy trees and forests and want to work in forested settings. They appreciate nature and want to master the knowledge and skills needed to conserve and manage forests and the environment. With 25,000 acres of College forest lands as teaching and research laboratories, ESF provides many opportunities to meet student needs for experiential learning. The forest technology program at ESF's Wanakena campus prepares students for careers in field forestry and is a route to the forest resources management program that emphasizes field practice. Internships with forest-based organizations in the private, public and nonprofit sectors amplify these hands-on experiences. Practical experience is combined with learning concepts and problem solving and critical thinking skills in the classroom and laboratory on ESF's Syracuse campus. The educational outcomes of the forest resources management degree program are among the best anywhere in North America.

Forest resources management is an integration of forest ecology and biology, forest measurements, forest policy and administration, and courses to predict and evaluate the effects of manipulation. Timber, water, soils, recreation, wildlife, and a broad array of environmental values and services, such as biodiversity and healthy forest systems, are important results of effective management. This major prepares students to be well-rounded generalists who can practice forestry and succeed as professionals in a variety of allied natural resource management fields.

The educational program in forest resources management, leading to the professional bachelor of science degree in forest management, is accredited by the Society of American Foresters (SAF). SAF is recognized by the Commission on Recognition of Postsecondary Accreditation as the specialized accrediting body for forestry in the United States.

Forest management offers a wide variety of employment opportunities. Our graduates are working throughout the United States as professional foresters and natural resource managers in public agencies, private industry, and for nonprofit organizations. Their duties range from timber management to recreation planning to environmental education, to name a few.

The undergraduate curriculum in forest resources management consists of two broad categories of courses. The first category, general education, provides students with knowledge and skills that are useful and important for all educated persons regardless of their profession as well as preparation for advanced courses leading to a specific profession. The second category, professional courses, provides students with direct preparation for a career. The first two years of college usually focus on general education and the second two on the professional studies.

Summer Program

The Summer Program is required for ALL students in forest resources management. Students who completed an A.A.S. degree from the ESF Ranger School meet this requirement through transfer credits. The program is a four-week session that begins at the end of May and lasts through late June. It is taught at ESF's Wanakena Campus in the Adirondacks. The program consists of one course: FOR 304 Adirondack Field Studies. Students must complete the summer program before the junior year.

Program Admission

Students may follow one of three paths to enter and complete the forest resources management program:

The freshman path is for students who enter ESF as freshmen and complete all degree requirements at ESF with the Summer Program after the second year.

The combined A.A.S./B.S. path is for students who wish to have more field measurement and field problem-solving skills and leadership development in context of forestry problems. The first year can be at ESF or another college and the second year is spent at The Ranger School, Wanakena campus. Students then complete their B.S. degree requirements at ESF. This path can be completed in a total of four years with careful planning.

The transfer path is for students who complete all or part of their lower division coursework at another two- or four-year campus, attend the Summer Program the summer before entering ESF and complete the upper-division requirements at ESF. Students preparing to transfer to ESF with full junior status must have earned at least 60 credits of college coursework.

Undergraduate Program Requirements

Lower Division Required Courses (47 credits)

Courses					Credits
APM	104	College Algebra and Precalculus Meets the requirements for general education skills and knowledge area. A complete listing of ESF or Syracuse University courses that meet general education standards established by SUNY in Undergraduate Education .	G	3	
APM	391	Introduction to Probability and Statistics		3	
EWP	190	Writing and the Environment	G	3	
EWP	290	Writing, Humanities and the Environment	G	3	
EWP	220	Public Presentation Skills for Environmental Professionals		3	
EFB	101/ 102	General Biology I and Laboratory	G	4	
EFB	336	Dendrology	PE	3	
ESF	200	Information Literacy		1	
FCH	150/ 151	General Chemistry I and Laboratory		4	
FOR	132	Orientation Seminar: Forest and Natural Resources Management	PE	1	

		Required for all students (freshmen and transfers). Professional education course		
FOR	203	Western Civilization and the Environment	G	3
FOR	204	Natural Resources in American History	G	3
FOR	207	Introduction to Economics	G	3
FOR	232	Natural Resources Ecology	PE	3
FOR	332	Forest Ecology	PE	3
PHY	101/ 102	General Physics I and Laboratory (or EFB 200 3 hrs)		4

Electives (6 credits)

General Education Course: Other World Civilization			G	3
General Education Course: The Arts			G	3

Required Summer Courses (4 credits)

The summer following the second year, students must take:

FOR	304	Adirondack Field Studies	PE	4
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Upper Division Required Courses (38 credits)

ESF	300	Introduction to Geospatial Information Technologies		3
ESF	332	Seminar for New Transfer Students Required for students who enter as transfer students		0
FOR	360	Principles of Management		3
FOR	322	Forest Mensuration	PE	3
FOR	323	Forest Biometrics		3
FOR	333	Natural Resources Managerial Economics	PE	3
FOR	334	Silviculture	PE	4
FOR	345	Introduction to Soils	PE	3
FOR	370	Forest Management Decision Making & Planning	PE	3
FOR	372	Fundamentals of Outdoor Recreation	PE	3
FOR	373	Forest Operations	PE	3
FOR	402	Professional Forestry Mentoring Program	PE	1
FOR	465	Natural Resources Policy	PE	3
FOR	490	Integrated Resources Management	PE	3

Electives (33 credits)

Technical Electives Technical electives must include at least one course in vegetation manipulation, water resources, forest health, wildlife management, and wood technology/science. Students should consult with their advisor and the Forest and Natural Resources Management Handbook for recommended courses			PE	15
Electives			PE	18

Total minimum credits for the degree 128 credits

Bachelor of Science in Natural Resources Management

The natural resources management program is based on a vision that combines professional competency in management skills with a strong foundation in the social and biophysical sciences. Students interested in this program typically are drawn to natural settings and environments, enjoy nature and want to develop the professional knowledge and skills needed to conserve, steward and manage natural resources and the environment. ESF provides a wide variety of opportunities to meet student needs utilizing 25,000 acres of forest lands as teaching laboratories and College faculty in many natural resource management disciplines. Experiential field learning is combined with learning concepts and skills in the classroom and laboratory on ESF's Syracuse campus.

The natural resources management program allows students to develop professional skills that employers tell us are the most important traits they look for in new employees. These traits are developed through a broad base of classes in the natural sciences, social sciences and humanities, communication, and quantitative and qualitative problem-solving skills. The majority of work scheduled during the first two years (lower division) is in these areas. This major prepares students to be well-rounded natural resources managers, provides them a ready opportunity to minor in specific areas of disciplinary interest, and prepares them with a foundation for future graduate degree work.

Natural resources management offers a wide variety of employment opportunities. Graduates work throughout the United States in public agencies, private industry, and for nonprofit organizations. Their duties range from policy analysis for federal agencies to resource managers for nonprofit organizations; from recreation planning for state park agencies to recreation management in federal wilderness areas; and from watershed hydrologists to land managers maintaining surface water quality.

Summer Program

The Summer Program is required for ALL students in natural resources management. Students who completed an A.A.S. degree from the ESF Ranger School meet this requirement through transfer credits. The summer program is a four-week session that begins at the end of May and lasts through late June. It is taught at ESF's Wanakena Campus in the Adirondacks. The program consists of one course: FOR 304 Adirondack Field Studies. Students should complete the summer program before the junior year.

Program Admission

Students may follow one of three paths to enter and complete the natural resources management program:

The freshman path is for students who enter ESF as freshmen and complete all degree requirements at ESF with the Summer Program after the second year.

The combined A.A.S./B.S. path is for students who wish to have more field measurement and field problem-solving skills and leadership development in context of environmental and natural resources conservation problems. The first year can be at ESF or another campus and the second year is spent at The Ranger School, Wanakena campus. Students then complete their B.S. degree requirements at ESF. This path can usually be completed in a total of four years.

The transfer path is for students who complete all or part of their lower-division coursework at another two- or four-year campus, attend the Summer Program the summer before entering ESF and complete the upper-division requirements at ESF. Students preparing to transfer to ESF with full junior status must have earned at least 60 credits of college coursework.

Undergraduate Program Requirements

Lower Division Required Courses (40 credits)

APM	104	College Algebra and Precalculus Meets the requirements for general education skills and knowledge area. A complete listing of ESF or Syracuse University courses that meet general education standards established by SUNY in Undergraduate Education .	G	3
APM	391	Introduction to Probability and Statistics		3
EWP	190	Writing and the Environment	G	3
EWP	220	Public Presentation Skills for Environmental Professionals		3
EFB	101/ 102	General Biology I and Laboratory	G	4
EFB	103/ 104	General Biology II and Laboratory		4
EFB	320	General Ecology		4
ESF	200	Information Literacy		1
FCH	150/ 151	General Chemistry I and Laboratory		4
FCH	152/ 153	General Chemistry II and General Chemistry Laboratory II		4
PHY	211/ 221	or General Physics I and General Physics Laboratory I		
FOR	132	Orientation Seminar: Forest and Natural Resources Management Required for all students (freshmen and transfers). Professional education course	PE	1
FOR	207	Introduction to Economics	G	3
FOR	360	Principles of Management		3

Lower Division Elective Courses (18 credits)

General Education Course: American History			G	3
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General Education Course: The Arts	G	3
General Education Course: Western Civilization	G	3
General Education Course: Other World Civilizations	G	3
General Education Course: Humanities	G	3
Sociology or Psychology course FOR 202 Introduction to Sociology (3), SOC 101 Introduction to Sociology (3), or PSY 205 Foundations of Human Behavior (3)		3

Required Summer Courses (4 credits)

The summer following the first or second year, students must take:

FOR	304	Adirondack Field Studies	PE	4
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Upper Division Required Courses (30 credits)

EWP	405	Writing for Science Professionals		3
ESF	300	Introduction to Geospatial Information Technologies		3
FOR	321	Forest Ecology and Silviculture		3
FOR	333	Natural Resources Managerial Economics	PE	3
FOR	340	Watershed Hydrology		3
FOR	345	Introduction to Soils	PE	3
FOR	372	Fundamentals of Outdoor Recreation		3
FOR	465	Natural Resources Policy	PE	3
FOR	488	Natural Resources Agencies and Administration		3
FOR	490	Integrated Resources Management	PE	3

Upper Division Elective Courses (30 credits)

Accounting or Finance Course ACC 201 Introduction to Accounting for Non-Management Students (3) or FIN 301 Finance for Non-Management Students (3).	3
Human Dimensions Course EST 390 Social Processes and the Environment (3), FOR 312 Sociology of Natural Resources (3), or FOR 475 Human Behavior and Recreation Visitor Management (3)	3
Wildlife or Fisheries Course EFB 390 Wildlife Ecology and Management (4) EFB 487 Fisheries Science and Management (3) or EFB 493 Wildlife Habitats and Populations (4)	3
Electives	21

Total minimum credits for the degree 122 credits

Bachelor of Science in Forest Ecosystem Science

The bachelor of science in forest ecosystem science degree program is based on a vision that combines professional competency in forest management skills with an enhanced understanding of ecological sciences. Students interested in this program typically are drawn to natural settings and environments, enjoy nature, and want to understand how forested ecosystems work. ESF provides a wide variety of opportunities to meet student needs utilizing 25,000 acres of forest lands as teaching laboratories. Internships with natural resource-based organizations in the business, public and nonprofit sectors provide additional hands-on experiences. Experiential field learning is combined with learning concepts and skills in the classroom and laboratory on ESF's Syracuse campus.

The program allows students to develop professional skills that employers look for in new employees. These skills are developed through a combination of core courses required in the undergraduate programs in forest resources management and in environmental biology. Forest ecosystem science offers a wide variety of employment opportunities. Graduates work throughout the United States in public agencies, private industry, and for nonprofit organizations. They also are well prepared to enter graduate programs in management of natural resources, ecological research, or other areas of applied forest biology.

The undergraduate curriculum in forest ecosystem science consists of two broad categories of courses. The first category, general education, provides students with knowledge and skills that are useful and important for all educated persons regardless of their profession as well as preparation for advanced courses leading to a specific profession. The second category, professional courses, provides students with direct preparation for a career. The first two years of college usually focus on general education and the second two on the professional studies.

Summer Program

The Summer Program is required for ALL students in forest ecosystem science. Students who completed an A.A.S. degree from the ESF Ranger School meet this requirement through transfer credits. The program is a four-week session that begins at the end of May and lasts through late June. It is taught at ESF's Wanakena Campus in the Adirondacks. The program consists of one course: FOR 304 Adirondack Field Studies. Students must complete the summer program before the junior year.

Program Admission

Students may follow one of three paths to enter and complete the forest ecosystem science program:

The freshman path is for students who enter ESF as freshmen and complete all degree requirements at ESF with the Summer Program after the second year.

The combined A.A.S./B.S. path is for students who wish to have more field measurement and field problem-solving skills and leadership development in context of natural resource problems. The first year can be at ESF or another campus and the second year is spent at The Ranger School on the Wanakena campus. Students then complete their B.S. degree requirements at ESF. This path can be completed in a total of four years with careful planning.

The transfer path is for students who complete all or part of their lower-division coursework at another two- or four-year campus, attend the Summer Program the summer before entering ESF, and complete the upper-division requirements at ESF. Students preparing to transfer to ESF with full junior status must have earned at least 60 credits of college coursework.

Program Requirements

Lower Division Required Courses (47 credits):

Courses			Credits	
APM	105	Calculus and Its Applications I Meets the requirements for general education skills and knowledge area. A complete listing of ESF or Syracuse University courses that meet general education standards established by SUNY in Undergraduate Education .	G	4
APM	391	Introduction to Probability and Statistics		3
EWP	190	Writing and the Environment	G	3
EWP	290	Writing, Humanities and the Environment	G	3
EFB	101/ 102	General Biology I and Laboratory	G	4
EFB	103/ 104	General Biology II and Laboratory		4
ESF	200	Information Literacy		1
FCH	150/ 151	General Chemistry I and Laboratory		4
FCH	152/ 153	General Chemistry II and Laboratory		4
FOR	132	Orientation Seminar: Forest and Natural Resources Management <i>Professional education course</i>	PE	1
FOR	207	Introduction to Economics	G	3
FOR	232	Natural Resources Ecology	PE	3
FOR	332	Forest Ecology	PE	3
FOR	360	Principles of Management	PE	3
PHY	211/ 221	General Physics I and Laboratory		4

Lower Division Elective Courses (6 credits):

General Education Course: American History			G	3
General Education Course: Western Civilizations			G	3

Upper Division Required Summer Courses (4 credits):

The summer following the second year, students must take:

FOR	304	Adirondack Field Studies	PE	4
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Upper Division Required Courses (minimum 25 credits):

EFB	336	Dendrology	PE	3
ESF	300	Introduction to Geospatial Information Technologies	PE	3
FOR	322	Forest Mensuration	PE	3
FOR	323	Forest Biometrics	PE	3
FOR	334	Silviculture	PE	4
FOR	345	Introduction to Soils	PE	3
FOR	465	Natural Resources Policy	PE	3
FOR	490	Integrated Resource Management	PE	3

Upper Division Elective Courses (42 credits):

Directed Electives: Biology	PE	9
Directed Electives: Ecology and Ecosystems	PE	9
Directed Electives: Management and Human Dimensions	PE	9
Students should consult with their advisors and read the Forest and Natural Resources Management Handbook for lists of courses that can be elected to meet degree requirements.		
Free Electives		15

Total minimum credits for the degree 124 credits

Graduate Programs

The Department of Forest and Natural Resources Management (FNRM) offers the master of science (M.S.), the master of professional studies (M.P.S.), the master of forestry (M.F.), and doctor of philosophy (Ph.D.) degrees. The graduate program is organized in areas of study designed to provide students with a strong background within specific interest areas. Faculty with nationally and internationally recognized expertise define the area of study's subject matter and guide students through an individually-designed program of study appropriate to student goals and aspirations. The FNRM graduate program prepares students for careers in resource administration, management, scientific research, professional education, and a variety of other specialized positions related to the sustainable management of forest ecosystems. Students with a non-natural resources bachelor's or master's degree and a strong interest in forests are encouraged to apply.

Master of Forestry (M.F.): The M.F. degree is designed to provide students with non-forestry baccalaureates a professional education in forestry. As such, the degree is designed to be students' first professional degree in forestry. The degree is appropriate for students who want to successfully function as professional foresters on multidisciplinary forest management teams and respond to the challenges related to the sustainable management of local, regional, and global forest resources.

The degree requires 37 graduate credits of coursework. At least 24 of the coursework credits must be taken in residence at ESF. The degree meets the accreditation standards of the Society of American Foresters. The current Forest and Natural Resources Management Graduate Handbook (www.esf.edu/fnrm/documents/GraduateHandbook.pdf) provides more detail on specific course requirements.

Master of Professional Studies (M.P.S.): The M.P.S. degree is a coursework-based degree that enables students to increase, define, and integrate their natural science and social science knowledge and expertise in forest and natural resources management. The degree is designed to be the first professional degree in forest and natural resources management. It is appropriate for students with a baccalaureate degree in a natural resources-related discipline interested in enhancing their knowledge of forest and natural resources management, and for students with other baccalaureate degrees seeking an expertise in forest and natural resources management.

The degree requires at least 30 graduate credits of coursework. At least 24 of the course credits must be taken in residence at ESF. Within these credits, students must complete a core of required courses and other requirements. The current Forest and Natural Resources Management Graduate Handbook (www.esf.edu/fnrm/documents/GraduateHandbook.pdf) specifies these requirements.

Master of Science (M.S.): The M.S. degree enables students to investigate practical forest and natural resources research problems and apply their specialized knowledge to solve those problems. The degree provides students with coherent body of theory and a set of appropriate methods to test that theory by completing a thesis. The M.S. degree is appropriate for students entering professions that require a research-based degree (such as environmental agencies and organizations that focus on science) and for students planning on completing a Ph.D. degree.

The degree requires at least 30 graduate credits, of which 24 are for coursework and six for the thesis. One-half of the 24 hours of coursework must be at the 600-level or above. At least 18 of the coursework credits must be taken in residence at ESF. All students must take one FOR 797 topical seminar and one additional graduate seminar.

Doctor of Philosophy (Ph.D.): The Ph.D. degree is normally built upon a M.S. degree, but in some instances it can be undertaken after a non-research based graduate degree (such as a J.D., M.B.A, M.P.A, or M.P.S. degree). The degree provides students with an opportunity for in-depth study and to conduct a comprehensive scientifically based research program using advanced research tools. Ph.D. dissertations are expected to lead to a number of peer-reviewed articles in influential journals. The degree is appropriate for students interested in advanced positions as forest and natural resources educators, managers, and analysts.

The degree requires at least 60 graduate credit hours, of which 48 are for coursework and 12 for the dissertation. One-half of the 48 hours of coursework must be at the 600-level or above. At least 24 coursework credits must be taken in residence at ESF. All students must take one FOR 797 topical seminar and one additional graduate seminar.

Research Facilities and Faculty

FNRM students work with faculty in a variety of sophisticated laboratories. Graduate students have access to diverse analytical equipment and measuring devices, and comprehensive, investigative computing capabilities. FNRM faculty and students conduct research throughout the world, particularly in the northeastern United States. ESF's 25,000 acres on regional New York state campuses and field stations offer a broad diversity of forest ecosystems for teaching and intensive research that evaluates terrestrial and aquatic environments. Faculty and students also pursue research on lands managed by the state Department of Environmental Conservation, USDA Forest Service, U.S. Fish and Wildlife Service, National Park Service, and Bureau of Land Management. Many students also conduct research and serve internships in Washington, D.C., New York City, Albany, and other international, national, regional, and state resource management headquarters.

FNRM graduate students work closely with faculty recognized by their students and peers as among the best in the world. FNRM faculty include SUNY Distinguished Teaching Professors and Distinguished Service Professors, as well as recipients of the SUNY Chancellor's Award for Excellence in Teaching, the SUNY Chancellor's Award for Professional Service, and the ESF President's Public Service Award. More than a third of FNRM professors have been awarded the ESF Distinguished Teacher Award by the ESF student body, many more than once. ESF professors also serve in leadership roles in professional societies.

Funding Opportunities

More than 70 percent of full-time FNRM graduate students receive partial or full support through graduate research or teaching assistantships. Awards range from \$11,060 to \$27,000 per year. All fully supported students receive tuition scholarships and health insurance. In addition to assistantships, FNRM annually awards several fellowships, based on students' accomplishments and promise for future professional and personal development. We also offer some graduate student stipends to support semester-long and summer internship experiences.

Collaborative Arrangements

FNRM encourages interdisciplinary graduate programs. This often involves selecting steering committee members from other ESF and Syracuse University departments, or more formally, by arranging for joint study with other college departments and with Syracuse University. Concurrent degree programs that provide the student with two masters' degrees, one from ESF and another from Syracuse University, are available with the following SU schools: Whitman School of Management, Maxwell School of Citizenship and Public Affairs, S.I. Newhouse School of Public Communications, and School of Education.

Concurrent degree programs usually add at least an additional year to a master's program of study. To be eligible, a student must have been matriculated full-time at the College for at least one semester, have a grade point average of at least 3.5, and be formally accepted into the concurrent degree program by the other school. Students who are interested in any of these programs must complete an application process through the ESF Office of Instruction and Graduate Studies within their first year of study.

Areas of Study

The FNRM graduate degree program offers students opportunities to pursue individualized advanced study in seven areas of study or an interdisciplinary doctoral program. Each area of study description includes a sampling of faculty members' research interests and employment opportunities. With more than 75 graduate students currently in FNRM programs, these examples are only highlights from the wealth of opportunities available. Additional information about each of these areas of study is available by telephone, e-mail, or written request to any of the professors listed and at: www.esf.edu/fnrm/graduate.

Ecology and Ecosystems (M.P.S., M.S., Ph.D.)

The Ecology and Ecosystems area of study focuses on the structure, function, dynamics, and resilience of terrestrial ecosystems, at a range of scales, from tree genetics and plant physiology to landscape ecology, modeling and remote sensing. Because functioning and resilient ecosystems are central to human well-being, research opportunities in this area of study address a diversity of topics that help us better understand and enhance the sustainability of terrestrial ecosystems in a rapidly changing world.

Topic Area	Participating Faculty
Forest Ecology	Beier, Yanai, Briggs, Volk, Nyland, Stella, Nowak, Bevilacqua, Maynard, Johnston
Watershed Ecology	Stella, Briggs, Vidon, Yanai
Soils	Briggs, Nowak, Yanai, Johnston
Biogeochemistry	Yanai, Vidon, Nowak, Johnston
Landscape Ecology	Beier, Stella, Nowak, Bevilacqua
Forest Health	Nyland, Maynard, Beier, Nowak, Yanai, Germain, Johnston
Restoration Ecology	Nowak, Stella, Nyland, Maynard,
Tree-ring Science (Dendroecology and Dendroclimatology)	Stella, Beier, Bevilacqua
Ecological Modeling	Yanai, Stella, Beier, Vidon, Bevilacqua

Management (M.P.S., M.S., Ph.D.)

The Management area of study focuses on both the underlying theory and on-the-ground application of practices to achieve sustainable outcomes in natural resource systems. Because management practices and decisions arise from the combination of ecological knowledge,

economic considerations and landowner/manager objectives and/or policies, research opportunities in management are interdisciplinary by nature.

Topic Area	Participating Faculty
Silviculture	Nyland, Nowak, Germain, Bevilacqua, Volk, Maynard, Beier, Johnston
Integrated Vegetation Management	Nowak
Forest Management and Operations	Germain, Wagner, Nyland, Nowak
Forest Biotech and Tree Improvement	Maynard
Agroforestry/Short Rotation Woody Crops	Volk, Johnston
Forest Management for Renewable Energy	Volk, Beier, Germain, Malmshiemer
Recreation Management	Kuehn
Ecotourism & Nature Tourism	Kuehn
Watershed Management	Briggs, Vidon, Stella, Nowak, Germain, Yanai

Economics, Governance and Human Dimensions (M.P.S., M.S., Ph.D.)

The Economics, Governance and Human Dimensions area of study emphasizes the human dimensions of resource systems involved in the processes of decision-making and action related to how coupled human-natural systems may be managed for sustainable outcomes. This area of study also incorporates rigorous research into human behavior in recreational and natural settings, a topic that draws from multiple disciplinary perspectives in the social sciences.

Topic Area	Participating Faculty
Forest and environmental economics	Wagner, Newman
Ecological economics	Luzadis, Beier
Ecosystem services	Luzadis, Beier, Wagner, Malmshiemer, Newman, Briggs
Policy	Malmshiemer, Luzadis, Wagner, Germain, Beier, Newman
Law	Malmshiemer
Human Behavior in Recreational Settings	Kuehn, Luzadis

Monitoring, Analysis and Modeling (M.P.S., M.S., Ph.D.)

The Monitoring, Analysis and Modeling area of study focuses on the application of statistical and operations research methods and techniques used to sample, describe and predict how individual trees, forest stands and terrestrial ecosystems change over both temporal and spatial scales. Because trees and forests respond in varying ways to an array of human and natural disturbances, research opportunities in this area of study address a diversity of topics that help us to better understand and evaluate the dynamics of terrestrial ecosystems in a rapidly changing world.

Topic Area	Participating Faculty
Sampling/Inventory	Stehman, Bevilacqua
Biometrics	Zhang, Bevilacqua, Johnston
Growth and Yield Modeling	Bevilacqua, Zhang, Nyland
GIS/Spatial Analysis	Bevilacqua, Beier, Zhang
Quantitative Silviculture	Zhang, Bevilacqua, Nyland, Johnston
Operations Research	Wagner
Simulation	Wagner, Bevilacqua