Natural Resources Science and Management graduate studies program
– Graduate Student Learning Outcomes –

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Program Background
The Natural Resources Science and Management (NRSM) graduate studies program develops scholars and practitioners who have expertise in the science and management of natural resources and the environment. The NRSM program is among the top ranked programs of its kind in the nation, rated as high as number two nationally among its peers. It has 116 faculty members who reside in several departments spanning six colleges within the University, as well as several adjunct faculty members who are affiliated with external organizations.

The NRSM program offers two graduate degrees: Master of Science (both Plan A and B) and the Doctor of Philosophy. The program’s 115 students represent a wide variety of educational backgrounds, geographic origins, and career objectives. Program graduates find employment in public, private, and non-profit sectors. Many NRSM graduates establish themselves as leaders in research, academia, public land and resource management, and business.

The NRSM program is truly interdisciplinary, with students specializing in one of eight areas of study (tracks) that cover the biological, physical, ecological, social, managerial, and engineering sciences. These eight tracks include the following:

Forests: Biology, Ecology, Conservation, and Management. The track focuses on various biological aspects of forest resources. Students specialize in areas such as forest biology, ecology, ecophysiology, genetics and tree improvement, tree physiology, reproductive biology, forest regeneration, forest growth and vegetation dynamics, timber harvesting, silviculture, sustainable forest management, landscape ecology, restoration and management, conservation of biodiversity, forest-based wildlife habitat management, forest health, disturbance ecology (including fire), urban and community forestry, and agroforestry.

Economics, Policy, Management, and Society. The track focuses on how society values and makes decisions about the use, management, and protection of natural and environmental resources. Students specialize in areas such as economics, policy, administration and management, planning, operations research, conflict resolution, human dimensions, and land use planning.

Wildlife Ecology and Management. The track focuses on the conservation and management of wildlife resources. Students specialize in areas such as ecology, physiology, evolution, genetics, statistics, computer science, forestry, natural resource policy, and the social sciences as they relate to wildlife.

Forest Hydrology and Watershed Management. The track focuses on the earth sciences, soils, and water resources management with an applied focus on wildland ecosystems, which may include the interface of forests with grasslands, wetlands, and agriculture. Students specialize in areas such as forest hydrology, water quality, and watershed management.
Assessment, Monitoring, and Geospatial Analysis. The track focuses on measurements and related technology applications and resource analysis. Students specialize in areas such as geographic information systems (GIS), remote sensing, geospatial analysis, survey design (including forest inventory and monitoring), measurement, modeling, and biometrics.

Recreation Resources, Tourism, and Environmental Education. The track focuses on the use and management of natural resources for recreation and tourism. Students specialize in areas such as recreational land management, resource-based tourism, recreation and tourism planning, environmental education and communication, and the human dimensions of natural resource use.

Paper Science and Engineering. The track focuses on the science of papermaking and related technologies. Students specialize in areas such as material chemistry and biotechnology, paper and fiber product material science, paper recycling, pulp and paper processing, energy and manufacturing efficiency, pulping and bleaching technology, transport processes, papermaking surface and colloid science, chemical engineering applications in pulp and paper processes, and process control.

Forest Products. The track focuses on various structural and engineering applications in the wood sciences. Students specialize in areas such as wood and fiber as raw materials, wood deterioration, mechanics and structural design, wood moisture interactions and drying, wood composite processing and performance, manufacturing systems, solid wood products technology and processing, marketing, housing component design and production, and energy-efficient building construction.

Process for Developing Student Learning Outcomes and Assessment Plans
The NRSM program has identified several student learning outcomes and ways in which it can assess the extent to which these outcomes are being achieved. These learning outcomes and assessment plans were prepared in consultation with NRSM faculty and graduate students. This process included a review of the draft student learning outcomes and assessment plans by the NRSM governing committee, a discussion of draft learning outcomes and assessment plans at NRSM program faculty and departmental faculty meetings, and in an open meeting with NRSM students. Additionally, NRSM faculty and students were given an opportunity to provide written comments on the draft student learning outcomes and assessment plan document.

Student Learning Outcomes and Means of Assessment
The goal of the NRSM program is to prepare students to become leading scholars and practitioners in the science and management of natural resources and the environment. It does so by training students to use a science-based approach to problem solving using critical thinking skills. The applied orientation of the NRSM program emphasizes the application of scientific principles to real world problems affecting natural resources and the environment.

The NRSM program has identified several desired learning outcomes for its students. These outcomes and means for assessing these outcomes are described below. Students pursuing a Master’s degree are not expected to achieve the same depth and breadth of subject matter expertise or develop the same level of mastery of these skills as doctoral students. Following
each student learning outcome is a statement (in italics) identifying how the NRSM program plans to assess the extent to which the outcome is being achieved. Note that student degree progress milestones (e.g., final oral examination) and annual accomplishment reporting are important tools for assessing many of these outcomes.

- Demonstrated proficiency of general concepts and principles relating to the use, management, and protection of natural resources.

  *One or more courses that expose students to core natural resource concepts and principles (biological, physical, or social). While graduate-level courses are preferred, foundational course(s) in natural resources taken at the undergraduate level (upper division coursework) are acceptable.*

- Demonstrated subject matter expertise in the student’s specialized area of study.

  *Multiple courses listed on the student’s approved Degree Plan that serve as a core for specialized knowledge in the student’s area of study.*

- Demonstrated coursework and research experience in an interdisciplinary setting.

  *One or more courses listed on the student’s approved Degree Plan that are outside the student’s core disciplinary area. The student’s research involves individuals outside the student’s core disciplinary area and/or the student’s examining committee consists of at least one member outside the student’s core disciplinary area.*

- Demonstrated competencies and skills that are sought by prospective employers.

  *Courses and training (for credit and otherwise) that provide the competencies and skills needed for the student to gain employment in his/her chosen field.*

- Demonstrated ability to identify and articulate important and relevant research questions or information needs.

  *Approval by the NRSM program of the student’s Research Plan that accompanies the student’s Degree Plan.*

- Demonstrated ability to conceptualize, articulate, and execute a plan for conducting research that addresses important and relevant research questions or information needs.

  *Successful defense of a Master’s thesis (Plan A or B) or doctoral dissertation.*

- Demonstrated competency in one or more methods for collecting and/or analyzing data.

  *One or more methods courses included on the student’s approved Degree Plan relevant to the student’s research or subject matter expertise. Demonstrated competency in one or more methods for collecting and/or analyzing data and communicating results obtained through data analysis.*
• Demonstrated ability to effectively communicate the execution of a research plan through preparation of a formal thesis or dissertation, research project reports, and scientific articles.
  *Successful defense of Master’s thesis (Plan A or B) or doctoral dissertation; submission of research project report(s); publication of peer-reviewed journal article(s) (publication of journal articles not a graduation requirement).*

• Demonstrated ability to effectively present the student’s research and its implications to peers and the general public.
  *Successful completion of FNRM 8107 (graduate seminar) or its equivalent; presentation(s) at professional conferences to practitioners and/or the general public.*

• Demonstrated ability to apply critical thinking skills.
  *Successful completion of preliminary (doctoral students) and final oral examinations (master’s and doctoral students); participation in departmental seminars or colloquia.*

• Demonstrated commitment to serving the profession and society at large.
  *Membership in professional societies, attendance at professional meetings; participation in departmental, graduate program, collegiate, and university-wide task forces and/or meetings; interaction with professionals, stakeholders, and the general public with regard to the student’s research or related outreach activities.*

• Demonstrated commitment to the ethical conduct of research and professional activities.
  *Successful completion of the NRSM ethics training provided as part of FNRM 8107 or at the orientation workshop for new NRSM students (or equivalent ethics training).*

• Demonstrated experience and general proficiency in pedagogy (doctoral students).
  *Experience as a teaching assistant or assisting in supervising a laboratory; successful completion of one or more teaching practicum courses.*

• Development of a professional network.
  *List of non-committee professional contacts initiated and maintained.*