Course Syllabus
FNRM 3205/5205 Productivity and Ecology of Forest Soils
Spring 2018

Credit Hours: 3 credits
Location: 19 Green Hall
Days: Mondays, Wednesdays, Fridays
Meeting Times: 9:35 a.m. – 10:25 a.m.
Prerequisites: Prior coursework in Introductory Soils, Silviculture, Forest Hydrology, Biogeochemistry, and Applied Forest Ecology are strongly recommended.

Instructor: Robert Slesak, Adjunct Assistant Professor
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Saint Paul, MN 55108
Email: raslesak@umn.edu

Bulletin Description: Forest soils are fundamental to the development and function of forested ecosystems. This course will focus on soil-site factors affecting plant and wildlife communities, site quality estimation, site modification and enhancement, and the effects of forest management and other human-related disturbances on forest soil functions. Prior coursework in Introductory Soils, Silviculture, Forest Hydrology, Biogeochemistry, and Applied Forest Ecology are strongly recommended.

Student Workload Expectations: Per University of Minnesota guidance, a 3 credit course requires approximately 135 hours of student effort per semester (on average about 9 hours per week). This requirement will be fulfilled with 2 in-person classes each week, participation in online forums, and online quizzes and readings. In addition, each student will be required to critique a journal paper which will require a paper and in-class presentation.

Course overview: An understanding of forest soils is fundamental to sustainable forest resource management that encompasses a multitude of objectives. The application of forest soil science has three important components: an understanding of fundamental soil properties, the origins, dynamics and functions of forest soils, and use of practices, data, and interpretation to manage the forest soil resource. Specific topics to be covered in this course include: fundamental soil properties that control ecosystem functions, how forest soils differ from agricultural soils, how geology and topography affect forest soils, how plant communities are influenced by forest soils and interact to influence their composition, concepts of soil quality and productivity, how to estimate forest site quality from soils information, and the effects of existing and emerging threats to forest soil functions (e.g., climate change, invasive species).

The first portion of this course will use lectures and discussion to explore fundamental forest soil physical and chemical properties, develop an understanding of their importance to ecosystem functions, and evaluate their measurement and interpretation in field settings. This foundation will then be used to delve into understanding the linkages among forest soil quality, forest management, forest health and productivity and ecosystem functions including the production of timber, clean water, and habitat. We will focus on the following:

- Identification of critical physical and chemical soil properties and their relationship to topography (e.g., upland vs. lowland soils), climate, and geology (i.e., soil parent material);
- Recognizing, evaluating, and interpreting variation in soil properties and functions;
- Measurements of forest soil productivity and soil-plant interactions;
• Characterizing the interrelationships among soil, landscape properties, and climate to ecosystem functions;
• Methods of forest soil management including the incorporation of risk and uncertainty in decision-making;
• Effects of contemporary forest management practices on forest soil functions;
• Effects of invasive species on forest soils
• Implications of climate change for forest soil management and adaptation.

Course learning outcomes: At the end of this course, students should be able to:

1) Identify key forest soil properties and functions, evaluate their relative importance for a given set of site conditions, and develop strategies for their maintenance and enhancement;
2) Apply conceptual frameworks of soil-plant-landscape interrelationships to forest ecology issues in a variety of settings;
3) Evaluate the potential of alternative management practices to enhance or degrade forest soil productivity, and identify those most appropriate for a given set of site conditions and objectives;
4) Identify the soil functions that are most limiting to a given ecosystem service (e.g., production of timber and clean water), and develop strategies to maintain or enhance these services under existing and emerging threats;
5) Synthesize and critique published research findings, including identification of strengths and shortcomings related to experimental design and inference, and develop new and alternative approaches for assessment of a given issue based on this evaluation.

Anticipated Enrollment: 15-35

Required Texts:

Supplemental Readings and Materials: Additional articles will be used to supplement the required text. Copies of all materials will be available on the course website and in a file outside Room 115, Green Hall.

Course Format: The course will use a number of learning formats, including formal lectures, full class and small group discussion, online assignments (e.g., forums and quizzes), and student presentations. Students will be expected to participate in class discussions, and be respectful of all views and perspectives presented.

Classroom Conduct: All students at the University have the right to a civil, productive, and stimulating learning environment. In turn, instructors have a responsibility to nurture and maintain such an environment. Students who disrupt the educational process because of discourteous, threatening, harassing, or other aggressive behavior will be removed from class.

• Please arrive on time and stay the entire class period. If you must arrive late or leave early, please sit near the back door and try to enter or exit quietly.
• Turn off or silence your electronic devices (e.g., cellphones, laptops) before class begins.
• If you use a computer during class, please refrain from using it for non-course-related activities, as this may distract other students.
• Avoid eating lunch during class (drinks or light snacks are ok).

Absences and Late Policy: You are expected to be present for all class meetings. You are responsible for documenting the legitimacy of any absences. Legitimate absences include:
• illnesses certified by Boynton Health Service or your family physician
• emergencies caused by a death or serious illness in your immediate family
• participation in intercollegiate athletic events or other official University activities
• subpoenas, jury duty, military service, and religious observances

If you know that you will need to be absent on a particular day, let the instructor know beforehand. To retake an exam or submit a late assignment without penalty, you must provide documentation of your absence. Otherwise late assignments will be subject to a 25% penalty provided they are submitted within one week of the scheduled due date; late assignments will not be accepted after one week except in the case of a documented legitimate absence. There will be no makeup exams given without documentation.

Student Academic Integrity and Scholastic Dishonesty:
You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html). If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: http://www1.umn.edu/oscai/integrity/student/index.html. If you have further questions, please see the instructor.

Accommodations for Students with Disabilities: The University is committed to providing quality education to all students regardless of ability. Determining appropriate disability accommodations is a collaborative process. You as a student must register with Disability Services and provide documentation of your disability. The course instructor must provide information regarding a course's content, methods, and essential components. The combination of this information will be used by Disability Services to determine appropriate accommodations for a particular student in a particular course. For more information, please reference Disability Services: http://ds.umn.edu/student-services.html.

Student Mental Health and Stress Management: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: http://www.mentalhealth.umn.edu.

Sexual Harassment: Sexual harassment means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult the Board of Regents Policy: http://www1.umn.edu/regents/policies/humanresources/SexHarassment.html
Equity, Diversity, Equal Opportunity, and Affirmative Action: The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult the Board of Regents Policy: http://www1.umn.edu/regents/policies/administrative/Equity_Diversity_EO-AA.html.

Grading: The course is offered with A-F grading and P/F. The +/- system will be used in determining final grades. Marks will be on a standard scale based on the % of total points available (% indicate minimum necessary for a mark). Class participation will be taken into consideration when rounding final grades.

- A 93
- A- 90
- B+ 87
- B 83
- B- 80
- C+ 77
- C 73
- C- 70
- D 60
- F Less that 60

F Fail: Represents failure (no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) not completed and no agreement between the instructor and the student that the student would be awarded an I. (below 60 percent)

P Pass: Demonstrated achievement satisfies basic course requirements (>70 percent)

I Incomplete: Assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., hospitalization), a student is prevented from completing the work of the course on time. Requires a written agreement between the instructor and student specifying dates and conditions for completion of the make-up work.

<table>
<thead>
<tr>
<th>Homework assignments (10)</th>
<th>100 Points</th>
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<tbody>
<tr>
<td>Midterm 1</td>
<td>40 Points</td>
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<tr>
<td>Midterm 2</td>
<td>40 Points</td>
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<tr>
<td>Journal article critique and discussion</td>
<td>60 Points</td>
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<td>Research proposal (graduate students)</td>
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<td>Final Exam</td>
<td>60 Points</td>
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<tr>
<td><strong>Total Course Points</strong></td>
<td>300 Points</td>
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FNRM 5205 – Graduate Students: Graduate students should expect additional questions on exams, and the expectation for the quality of answer (i.e. internal logic and quality of writing) is higher than for undergraduate students. In place of leading a journal paper discussion, graduate students will develop a mock proposal for an original research question related to forest soil management.

Examination Policy: An examination will be given only once during the regular class session. If a student has a legitimate, unavoidable conflict, they need to make arrangements with the instructor for taking a make-up exam PRIOR to the scheduled examination time. Unexpected illness or documented personal emergencies are examples of exceptions to this policy.

Because the class only meets twice per week, it is important that class lectures and discussion take full advantage of the scheduled meeting time. Students should be prepared for class to begin on time, and come to class having completed the assigned readings corresponding to the lecture.
Additionally, students are expected to meet all the course scheduling/due dates for exams (see Examination Policy below) and homework assignments.

**Class Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>Course introduction, origin and dynamics of forest soils</td>
<td>Chapter 1 and 2</td>
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<tr>
<td>2</td>
<td>Soil formation, forest soil types (distribution and extent)</td>
<td>Chapter 3</td>
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<td>3</td>
<td>Physical properties of forest soils</td>
<td>Chapter 5</td>
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<tr>
<td>4</td>
<td>Chemical properties of forest soils</td>
<td>Chapter 8</td>
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<tr>
<td>5</td>
<td>Biological properties of forest soils</td>
<td>Chapter 6</td>
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<tr>
<td>6</td>
<td>Forest site classification / soil-vegetation relationships</td>
<td>Chapter 10 and 11</td>
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<td></td>
<td>Midterm exam 1</td>
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<td>7</td>
<td>Soil management: water</td>
<td>TBD</td>
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<tr>
<td></td>
<td>Undergraduate paper discussions begin</td>
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<tr>
<td>8</td>
<td>Soil management: nutrition</td>
<td>Chapter 7, 14</td>
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<tr>
<td>9</td>
<td>Soil organic matter and long-term soil productivity</td>
<td>Chapter 4</td>
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<tr>
<td>10</td>
<td>Soil and fire</td>
<td>Chapter 13</td>
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<tr>
<td>11</td>
<td>Soil and forest management practices</td>
<td>Chapter 12</td>
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<tr>
<td>12</td>
<td>Soil and invasive species</td>
<td>Chapter 13</td>
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<td></td>
<td>Midterm exam 2</td>
<td>TBD</td>
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<tr>
<td>13</td>
<td>Forest soils and climate change: importance and adaptation</td>
<td>Chapter 15</td>
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<tr>
<td>14</td>
<td>Graduate Student Presentations</td>
<td>NA</td>
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<tr>
<td>15</td>
<td>Graduate Student Presentations and final exam</td>
<td>NA</td>
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