

Spring Semester 2009
PSS 268 / NR 268 Soil Ecology

Lecture: MWF 9:35-10:25 am, Hills 17; Laboratory: MW 12:50-3:50, Hills 20

4 credit hours: 3 hours lecture + 3 hours laboratory per week

Instructor: Dr. Deborah Neher, Hills 6, 6-0474, deborah.neher@uvm.edu, Office Hours: MWF 10:30-11:30 am or by appointment

Teaching Assistant: Karen Lamoncha, 6-0690, Hills 123, karen.lamoncha@uvm.edu, Office Hours: TR 3-5 pm or by appointment.

Course web page: Blackboard

- Syllabus, lecture notes, laboratory exercises, required reading for lecture and laboratory, class project and paper details, useful URLs, study guide, academic policies, and more.

Course Description: Underlying concepts and theory of modern soil ecology will be reviewed including spatial and temporal distributions, sampling methods, biogeochemical cycles, and ecological functions of soil. *Prerequisites:* PSS 161 Fundamentals of Soil Science and BCOR102 Ecology, NR 103 or equivalent

Textbooks:

Required: Paul, E. A. 2006. *Soil Microbiology, Ecology and Biochemistry*, Third edition. Academic Press, New York. ISBN: 0-12-546807-5.

Recommended: Coleman, D. C. and Crossley, D. A. (CC) 2004. *Fundamentals of Soil Ecology*, Second edition, Academic Press, New York. ISBN: 0-12-179726-0.

Expectations/Evaluations (Grading: A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F)

- 1) Read assigned material *before* class
- 2) Attend and participate actively in all class discussions (5% for undergraduates, 0% graduates)
- 3) Two midterm examinations and a final examination (3 x 10% = 30%)
 - a) style: short answer, matching, multiple choice
 - b) includes topics from assigned reading, lectures and laboratory exercises
- 4) Laboratory participation and reports (20%) – details on class blackboard page
- 5) Class Project - topic must encompass the biology of at least one group of organisms and link with physical environment
 - a) Graduate students: Grant Proposal (25 %) and oral presentation (15 %)
 - b) Undergraduate students: research paper (35 %)

Class Project Deadlines:

March 6: Paper/Proposal outline with ≥ 3 primary literature sources identified

April 10: Graduate student written grant proposals due

April 13: Receive 2-3 grant proposals to peer-review

April 20: Written evaluations of grant proposals due

April 22-27: Peer-evaluation of oral presentations

April 29: Undergraduate research papers due

- 6) Participate in evaluation procedures of grant proposals (written and oral)
 - a) Critically review 2-3 grant proposals and evaluate all oral presentations (10%)

Important university dates: January 26: Add/drop, audit, pass/no pass deadline; March 30: Last Day to Withdraw; Exam Days (April 30, May 1, 4-5, 7-8)

Date	Read	Lecture Schedule	Laboratory schedule
Jan. 12 (1)	1	Introduction and history of the discipline	1/12-14: Intro/Microscopes; set up decomposition experiment
Jan 19		MARTIN LUTHER KING HOLIDAY	
Jan. 14-26 (6)	2	Soil as a habitat for organisms and their interactions (Guest: Josef Görres)	
Jan 28-30 (2)	11 (lect)	Occurrence and distribution of soil organisms (rhizosphere, spatio-temporal patterns)	1/26-28: Exercise 1. Soil Environment; Reading Assignment 1
Feb. 2-4 (2)	CC 2 10 (lab)	Primary production processes in soils	2/2-4: Exercise 2. Mycorrhizae, Protozoa, Root Length Density; Lab report 1 due; Reading assignment 2
Feb. 6-13 (4)	5,6	Secondary production: activities of heterotrophic microbes	2/9-11: Quantify Exercise 2
Feb 16		PRESIDENT'S DAY HOLIDAY	
Feb. 18		MIDTERM EXAM	
Feb. 20 (1)	3,4 (lab)	Details on class project (1)	2/23-25: Exercise 3. FDA hydrolysis, phenol oxidase, Rhizobia; Lab report 2 due; Reading assignment 3
Feb 25-Mar 2 (3)	7	Secondary production: activities of heterotrophic soil fauna (3)	
Mar 4 (1)	16	Coupled flows through food webs (Guest: Tom Weicht) (1)	3/2-4: Filler/catchup/discussion; possible trip to Hort Farm
Mar 6 (1)	18	Applied soil ecology: Environmental Monitoring (2) 3/6: Paper/proposal outline due	
Mar 9-13		SPRING BREAK	
Mar 16 (1)		Earthworms (fauna con't)	3/16-18: Exercise 4. Nematodes, Exercise 5. Microarthropods; Reading assignment 4; Lab report 3 due
Mar 18 (1)	pp. 471-494	Applied soil ecology: Natural Suppression of Soilborne Pathogens	
Mar 10-23 (2)	12	Ecological function of soils: carbon cycling and soil organic matter	3/23-25: Exercises 4 & 5 (con't); Reading assignment 5; collect lab notebooks
Mar 25-30 (3)	16, pp. 483-86	Composting / decomposition	3/30-4/1: Exercises 4 & 5 (con't);
Apr 1		MIDTERM EXAM	
Apr 3-8 (3)	13, 14	Ecological function of soils: nitrogen cycling; <i>Rhizobium</i>	4/6-8: Exercise 6: Modeling; Reading assignment 5; Lab report 4 due
Apr 10-13 (2)	10, 15	Ecological function of soils: phosphorus transformations; mycorrhizae 4/10: Written grant proposals due 4/13: Receive 2-3 proposals to peer-review	4/13-15: Filler/ catch-up / discussion; Reading assignment 6; Lab report 5 due
Apr 15 (1)	Web links	Sulfur – microbial biochemistry (Guest: Greg Druschel)	

Date	Read	Lecture Schedule	Laboratory schedule
Apr 17-20 (2)	pp. 413-30, 495-99	Applied soil ecology: Bioremediation	4/20-22: Statistical analysis; Lab report 6 due
Apr 22- 27 (3)		Graduate students make oral presentations of grant proposals 4/20: Written evaluations of grant proposals due	4/27-29: SAS; Final paper due; collect lab notebooks
Apr 29 (1)		Recap and course evaluation 4/29: Undergraduate research papers due	
		FINAL EXAM (final third)	