

SOIL 351: Soil Ecology 3 Credits; Fall semesters

Instructor: Dr. Amitava Chatterjee, Assistant Professor, Soil Science, 701-231-7858;

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Office hours: By Appointment

Lecture times: M W F 9.00 – 9.50 a.m.

Location: Walster 217

Prerequisite: None

Course goals: Students will be educated to understand the importance of belowground ecosystem functions and climate-plant-soil interactions and how soil ecology dictates the primary nutrient dynamics.

Course objectives: Students will be able to (1) classify different soil organisms and their role in soil functions, (2) soil organic matter formation, (3) cycle of major nutrients, (4) interactions among soil management, nutrient dynamics and microbial community.

Course Outline: Course outline is an approximate guideline for students, topics and time can be changed.

Lectures 1-3	August 27	<ul style="list-style-type: none"> course structure, evaluation, reading assignments syllabus overview Soil ecology as a subject, history, importance and role to society
	August 29	<ul style="list-style-type: none"> Soil habitat I- soil formation (CLORPT), development of soil profiles, soil horizons, classification,
	August 31	<ul style="list-style-type: none"> Soil habitat II soil properties and ecosystem functioning
Lecture 4-6	September 3	<i>Labor day Holiday</i>
	September 5	Soil as a microbial habitat
	September 7	Microbial growth and metabolism, soil enzymes
Lectures 7-9	September 10	Soil microbial classification, physiology and roles
	September 12	Soil microbial classification, physiology and roles I. Macrofauna and mesofauna
	September 14	Soil microorganisms –Fungi (Part 1) Classification and characteristics
Lectures 10-12	September 17	Soil microorganisms –Fungi (Part 2) Ecological roles
	September 19	Prokaryotes- Bacteria and Archea (Part 1) Classification, characteristics
	September 21	Prokaryotes- Bacteria and Archea (Part 2) Ecological roles
Lectures 13-15	September 24	Interactions _commensalism, mutualism and symbioses
	September 26	<ul style="list-style-type: none"> First Exam (50 objective questions in 50 min)
	September 28	Measuring population and diversity of soil organisms

Lectures 16-18	October 1	Soil Ecological processes and microbial function I. Decomposition • Introduction, overview • Fragmentation
	October 3	II. Chemical alteration
	October 5	Factors controlling decomposition
Lectures 19-21	October 8	Carbon cycle I
	October 10	Carbon cycle II
	October 12	Nitrogen cycle and soil organisms I. Brief overview of nitrogen cycle
Lectures 22-24	October 15	II. Nitrogen fixation and microorganisms
	October 17	Transformations of Nitrogen Nitrification-Immobilization-Volatilization
	October 19	Denitrification
Lecture 25-27	October 22	Biogeochemical cycling of Phosphorus and sulfur
	October 24	Biogeochemical cycling of trace elements
	October 26	Second Exam (50 objective questions in 50 min)
Lecture 28-30	October 29	Ecosystem management and soil biota -Principles
	October 31	I. Forest Ecosystem management
	November 1	II. Rangeland management
Lecture 31-33	November 5	III. Agricultural management – Tillage
	November 7	IV. Organic farming
	November 9	V. Bioremediation, Heavy metal toxicity
Lecture 34-36	November 12	<i>Veteran's Day</i>
	November 14	Scaling up soil ecological functions
	November 16	Climate change, global warming and soil ecology
Lecture 37	November 19	Presentation guidelines, discussion and exam overview
	November 26, 28, 30 & December 3, 5, 7	Student Project Presentation
	December 10	Final Exam (50 objective questions in 50 min)

Evaluation Procedure and Criteria

1. Assignments & quizzes:	20%
2. Exam 1:	20%
3. Exam 2:	20%
4. Final Exam:	20%
5. Project Presentation:	20%

Grade	Percentage
A	100-90.5
B	90.4-80.5
C	80.4-70.5
D	70.4-60.5
F	<60.4

Quizzes:

Quizzes will be comprised of topics covered in last three lectures and will be allotted at the end of Monday class. Questions will be objective type 10-20 questions.

Assignments:

Two types of reading assignments, (1) current newspaper article based on soil/environmental issues collected by students and (2) research articles provided by the instructor at the beginning of the week will be discussed at the end of Friday class. In both assignments, students will need to submit a short note (after Friday Class) with word limit of 450 words describing the problem and student's perspective for newspaper article and the research objectives, findings and shortcomings (if any) for the research article. Research article will be posted on the Blackboard every Monday and students will be responsible for obtaining their copy of the article. Reading assignments will be discussed at the end of Friday lecture. Grading for this portion will be based on the participation in discussion and the scientific merit of the short note.

Project Presentation:

Students will (1) submit a research proposal based on soil ecology, (2) prepare a research note based on critical analyses of peer-reviewed articles, and (3) prepare 10-minute powerpoint presentation. The research proposal will contain (1) brief overview, (2) the problem statement and objectives, (3) rationale and significance within single spaced one page. The research proposal will need to be pre-approved by the instructor and submitted within September 30. For the research note, you will need to collect at least 10 peer-reviewed articles and will follow the format of a review article (ask for a sample if you need a guideline). The write up should include at least two diagrams (not copied from article) and three figures/tables to illustrate or summarize the concept and findings. The final power point presentation will be based on the research note and evaluated by your class mates. You should submit the research note and presentation by 26th November.

Students with disabilities:

Any students with disabilities or other special needs requiring special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible.

Academic honesty:

All work in this course must be completed in a manner consistent with NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct.

<http://www.ndsu.nodak.edu/policy/335.htm>

For more information on the College of Agriculture, Food Systems, and Natural Resource's honor system, see <http://www.ag.ndsu.edu/academics/honor.htm>