

Soil Fertility

11:776:440 (3 credits)
Fall Semester (yearly)

CONTACT INFORMATION

Instructor: Dr. Joseph R. Heckman
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Office Hours: by arrangement

COURSE DESCRIPTION

Soil-plant relationships in the field and methods of diagnosing deficiencies in soils and plants.

COURSE WEBSITE, RESOURCES AND MATERIALS

- Course website: Sakai
- Recommended textbook: Brady, NC, RR Weil. 2007. The Nature and Properties of Soils, 14th. Prentice-Hall, Inc., Upper Saddle River. ISBN 0-13-852444-0
- Additional handouts and online materials are required reading.

PREREQUISITE

Prerequisite: 11:375:266 Soils and Their Management OR permission of instructor

COURSE LEARNING GOALS

(Link to Plant Biology Undergraduate Program Goals: <http://plantbiology.rutgers.edu/undergrad/plantbiology/>)

By the end of this course, the student will be able to:

1. Explain the fundamentals of soil fertility, including the function of essential plant nutrients in crops and in soils (addresses program goal 1)
2. Describe current issues in soil fertility and nutrient management in an ecological context (addresses program goal 2)
3. Discuss how nutrients cycle through soils, plants, animals, and the atmosphere (addresses program goal 1)
4. Read and interpret a soil test report, develop appropriate soil fertility recommendations, and manage nutrient cycles (addresses program goal 4)

ASSIGNMENTS/RESPONSIBILITIES AND ASSESSMENT

Grading (100 points):

- Quizzes (7, 10 points each) 70 points

- Class attendance, participation, and discussion 10 points
- Homework (written assignments, field trip reports) 10 points
- Final exam (cumulative) 10 points

Final grades:

A = 90-100 pts

B = 80-89 pts

C = 70-79 pts

D = 60-69 pts

Homework and writing assignments: Homework is typically short (maximum of one typed page or 300 words), written summaries from directed readings, guest lectures, field trips, etc. All homework and writing assignments must be typed on 8.5 x 11 white paper. Written homework assignments are due at the start of the following week class period. Homework may not be turned in by email to instructor, no exceptions.

Field Trips: Attendance on field trips (including to the Rutgers Soil Testing Laboratory) is required. You are encouraged to take notes and photographs to be used to write field trip reports. A field trip to several organic farms will be scheduled for early October.

Learning goals assessment: Specific questions on quizzes will be used to assess student knowledge of all course learning goals. In the soil test report assignment, students will integrate knowledge of soil fertility to develop soil fertility recommendations (course learning goal 4). The percentage score on these assessments will determine the level of mastery: >90% outstanding; 80-89% good; 70-79% satisfactory; <69% unsatisfactory.

PARTICIPATION GRADE AND ABSENCE POLICY

Attendance is mandatory. Missed class time will be reflected in the final course grade.

Students who expect to miss class may contact the instructor via e-mail prior to the missed class or may use the University absence reporting website (<https://sims.rutgers.edu/ssra/>) to indicate the date and reason for the absence. An e-mail is automatically sent to the instructor.

COURSE TOPICS

- Function of each of the 18 essential nutrients in plants (and in some cases animal health is discussed)
- Function of beneficial elements such as silicon
- Details of how each essential nutrient cycle through soils, atmosphere, water, plants, animals, and natural waste materials
- Environmental impacts of excess levels of N and P from applications of fertilizers and manures
- Limitations to soil fertility including soil acidity, alkalinity, soil pH, salinity, toxic elements or non-nutrients (Al, Pb, Cd, As)
- Liming soils to correct soil acidity
- Limestone quality
- Fertilizer laws and regulations
- Organic nutrient sources (compost, manures, crop rotation, cover crops, etc)
- Chemical fertilizer nutrient sources
- How to collect a good soil sample

- Soil test procedures in the lab
- Interpretation of soil test results
- Plant tissue analysis (sample collection and interpretation of results)
- Soil fertility management in both organic and conventional farming systems
- How annual and perennial crops differ in nutrient needs
- Soil fertility management protect plants from disease

FINAL EXAM/PAPER DATE AND TIME

The final exam is cumulative.

The Online Final exam Schedule: <http://finalexams.rutgers.edu/>

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/>

The principles of academic integrity require that a student:

- Properly acknowledge and cite all use of the ideas, results, or words of others.
- Properly acknowledge all contributors to a given piece of work.
- Make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- Obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- Treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- Uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that:

- Everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- All student work is fairly evaluated and no student has an inappropriate advantage over others.
- The academic and ethical development of all students is fostered.
- The reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

STUDENT WELLNESS SERVICES

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901 / www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.