

Florida International University
Department of Earth and Environment

SOIL MICROBIOLOGY – SWS 4303
APPLIED SOIL BIOLOGY – EVS 6194

COURSE SYLLABUS
FALL SEMESTER 2017

Class Time: Tuesday/Thursday 2:00 PM to 3:15 PM
Class Room: Tuesdays GL-250; Thursdays GC-283B

Dr. Kateel Shetty

(305) 348-0178

Office: VH 210

Office hours: MW 1:00 PM to 2:00 PM (by appointment)

E-mail: Contact through course Blackboard message system.

Course Overview

Soil Microbiology is a branch of science that deals with study of soil microorganisms and their activities in the soil, their functions, their interactions, and how they affect soil properties. This course will provide you with an understanding of the roles of soil organisms in the sustainability and productivity of various ecosystems. The course will give you an opportunity to become familiar with various types of plant-microbial interactions, nutrient cycling processes, carbon sequestration and ecosystem climate regulation. In addition, the students can gain basic knowledge concerning applied aspects of soil microbiology, including disease suppressive soils, the use of biological control agents, biopesticides, biofertilizers, and bioremediation agents. This course will be of interest to students from a broad range of scientific disciplines including biology, environmental science, agronomy, plant pathology, food science and ecology.

Course objectives:

1. Describe the microbial community diversity, occurrence and distribution in soil environments.
2. Develop comprehensive knowledge on roles of microorganisms in soil and plant process, including the biogeochemical cycling of carbon and inorganic nutrients.

3. Understand how soil microbial properties and processes influences soil physical and chemical properties, and vice versa.
4. Discuss how soil microbial properties affect the sustainability and productivity of agroecosystems and natural ecosystems.
5. Discuss potential beneficial and harmful effects of microorganisms on plants, soil quality and environmental quality.

Justification

Soil quality or soil health is the foundation of a sustainable agriculture. It has now been recognized that the microbial community in the ground (soil microbiome) is as important as the one in our guts (gut microbiome). Therefore, healthy soil microbes means healthy plants, and healthy plants means healthy people. Degraded agricultural soils due to intensive agricultural production practices are negatively affecting the soil microbiome productivity, sustainability and the environment. There is a growing awareness for the need for development of soil microbiological applications and practices to restore the fertility, productivity and sustainability. In addition, due to the emerging demand for green alternatives for plant productivity and protection within a holistic vision of development, interest in plant growth promoting rhizobacteria have gained wider attention and acceptance. Soil microbiology offers students a broad knowledge of the functions and interactions of microorganisms in soil, which is essential in order to address the long-term stewardship of the earth's soil resources, the associated ecosystem functions, and safe and secure food resources.

Suggested Text: Soil Microbiology: An Exploratory Approach, Mark Coyne
Delmar Publishers (part of Cengage Learning).

Internet Resources:

This is a web assisted course. A course webpage will be maintained with Blackboard Learning. There will be syllabus, course materials, assignments, articles, videos, rubric, and announcements posted on Blackboard.

To access this resource, go to <https://ecampus.fiu.edu/> and click on Blackboard under the Login menu. In the Blackboard Login window, enter your FIU MyAccounts User Name and Password. Select SWS 4303 or EVS 6194 - Section U01 – fall 2017. For help with Blackboard, click the Student menu on the ecampus website call the UTS Help Center at (305) 348-2284.

Course Outline

The Instructors reserve the right to change the outline, readings, exam dates, and project assignments and dates of materials covered in this course. There will be guest lectures on various topics by experts and will be announced in the class. Lab visits within the campus are required; prior announcement will be made in the class regarding the lab visits.

<u>Week</u>	<u>Topic</u>
Week 1	Introduction to Soil Microbiology; A Historical Overview of Soil Microbiology
Week 2	Soil As a Microbial Habitat; Environmental Influences – Temperature, Reduction-Oxidation, and pH
Week 3	Soil Water and Microbial Activity; Microbial Growth and Metabolism
Week 4	Microbial Growth and Metabolism; Soil Enzymes
Week 5	The Macrofauna; The Mesofauna – Nematodes
Week 6	Molecular Techniques; The Microfauna – Protozoa and Algae; Soil fungi
Week 7	Soil bacteria and virus
Week 8	Microbial breakdown of plant components
Week 9	Carbon cycle; Nitrogen cycle
Week 10	Nitrogen cycle; Plant-fungal associations
Week 11	Plant-fungal associations; Compost microbiology
Week 12	P solubilizing microbes; Biodegradation
Week 13	Endophytes; Plant-microbe interactions
Week 14	Student presentations

Course Evaluation:

Final grades are based upon a percentage of total points out of 100.
All items are subject to change.

Undergraduate Student Grading

Three exams (20%, 20%, 25%)	65%
Participation/In-class activities and assignments	25%
Journal Article Presentation and Discussion	10%
Total Possible Points 100	

Graduate Student Grading

Three exams (15%, 15%, 20%)	50%
Participation/In-class activities and assignments	15%
Journal Article Presentation and Discussion	10%
Project work, report and presentation	25%
Total Possible Points 100	

*****Participation/In-class Activities & Assignments**

This includes:

1. Attendance/Participation
 2. In-class activities - 10 points
 3. Quiz - 5 points
 4. Assignment - 10 points
- TOTAL 25 points**

Grade Evaluation Scale:

93 - 100 = A
89 - 92 = A-
86 - 88 = B+
83 - 85 = B
79 - 82 = B-
76 - 78 = C+
70 - 75 = C
59 - 69 = D
<58 = F

Attendance:

Everyone is expected to attend class and prepare for class in advance. Attendance is mandatory, and will be taken every class. If you miss class due to a valid, documented extenuating circumstance, it will not count as an absence. Examples of valid absences (excused absences) include: (a) family member serious illness or other emergency; (b) official academic/athletic event (e.g. field trip); or (c) recommendation from an MD.

Missing more than THREE classes will result in 5% loss of your final grade and missing more than FOUR days will result in 10% loss of your final grade. Every additional absence will lower your class grade by 10 percentage points. EIGHT or more unexcused absences may result in an “F” for the semester.

If you arrive to the class more than 10 minutes late, you are required to sign in on the LATE ARRIVAL SIGN-IN SHEET. Please take instructors prior approval if you plan to leave early. If you leave the class early, you are required to sign in on the EARLY DEPARTURE SIGN-IN SHEET. There will be deduction in participation points for being repeatedly late to the class and for leaving the class early.

Participation points will be awarded for attentiveness and positive contribution to class discussions. Conversely, points will be lost for unexcused absences, being late to the class, leaving the class at will, class disruptions, etc.

Late assignments will not be accepted except when due to the above-cited circumstances.

Course behavior:

Students will arrive on time, ready to participate in the day’s activities and remain until the end of class. Refrain from private conversations during the class. Although potential for beneficial use of technology in education is immense, based on my experience in the class during previous semesters, I found that laptop computer/tablet usage by students was mostly disrupting the class; *use of laptops and tablets is not allowed during the class. Students are not allowed to use their cellphones in class. They must be put away and set on vibrate mode. Students violating this policy will be asked to leave the class.* Any violations of the university honor code (available at <http://www2.fiu.edu/~daiglerr/code.htm>) will result in charges of academic misconduct. This includes any form of cheating such as use of unauthorized materials or communication during exams, plagiarism and so on. Students will behave in a respectful manner toward one another even during heated debates, regardless of how strongly you disagree. Students showing a lack of courtesy and consideration for the Instructor and other students will be asked to leave the classroom and will be marked absent for that session.

Honor Code:

Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

Cheating and plagiarism are violations of the academic honesty section of the FIU student code of conduct and will be reported to Judicial Services. Plagiarism is a serious offence will not be taken lightly. Plagiarism can be intentional (copying another student's work, collaborating too closely with another student) or unintentional (not citing all references, collaborating too closely with another student.) The best ways to avoid unintentional plagiarism are to reference all outside information, and to do all work on your own. If you have any questions about what is plagiarism, please ask the instructor. Instructors may use plagiarism detection software (such as turnitin.com) to determine if plagiarism has taken place. Suspected acts of plagiarism may be investigated and taken to the FIU Grievance Committee. Plagiarism will result in you receiving a 0 grade for your assignment (no exceptions) and may also result in your suspension or expulsion from the University.

Sexual Harassment Policy:

FIU's sexual harassment policy is available at:

http://hr.fiu.edu/index.php?name=sexual_harassment

Office of Disability Services for Students:

If you have a disability and need assistance, please notify me and also contact the Office of Disability Services for Students (University Park - GC 190; Ph. 348-3532). Upon contact, the Office of Disability Services for Students will review your request and contact your professors or other appropriate personnel to make arrangements for appropriate modification and/or assistance.

Please ask questions in class as this will greatly add to the discussion and learning process and let me know at any time throughout the term how I can be of help.

Note: *This syllabus and course schedule may be updated, if needed. An announcement of changes will be made in class and in Blackboard Learning class webpage.*