SOIL QUALITY (SWS 6134)

3 Credits- Fall 2016

INSTRUCTOR: Dr. Zhenli L. He, Professor
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COURSE OBJECTIVES: **To acquaint** students with basic concepts, principles, components, measurements, and evaluation of **soil quality** and its management for sustainable agriculture. Soil quality is the capacity of the soil to function within the ecosystem boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health. In this course, **s**tate-of-the-art studies on soil quality and the principles, assessment and management of soil quality are examined with respect to biological production, plant and animal health, food security, and environmental quality. After studying this course, the students should be able to understand basic principles of soil quality and to analyze and evaluate soil quality related to agricultural production and environmental quality.

DELIVERY METHOD: E-Learning System/Canvas and Audio lectures (with powerpoint presentations and reading materials)

FREQUENCY: Fall semester, every even year

TARGET STUDENTS: Graduate students who wish to become specialists in the management of nutrients, soils, agroecosystems, and environmental quality.

CLASS ATTENDANCE: **Attendance of chat sessions is mandatory.** There is 5% grade for chat room participation.

CHAT ROOM SESSION: Chat room session is scheduled 5-7 PM every Thursday except for public holidays.

GRADING:

Homework:	30%
Chat room attendance	5%
Mid-term Examination:	20%
Review or research Paper / presentation	20%
Final Examination	25%

Total	100%

There will be no make-up homework and exams. Late submission of assignments will result in reduced credit (10% per assignment) if it is not agreed upon in advance.

A	94 – 100%
A-	90 – 93%
B+	87 – 89%
B	83 – 86%
B-	80 – 82%
C+	77 – 79%
C	73 – 76%
C-	70 – 72%
D+	67 – 69%
D	63 – 66%
D-	60 – 62%
E	< 60%

ASSIGNMENTS/ EXAMS/PROJECTS /LECTURES

Soil quality is one of the rapidly-developing frontiers in soil and environmental sciences, with emphasis on soil's functions in plant and animal production, food safety, and environmental quality. This course involves many new concepts, principles, evaluation expertise, and test methods. It is important that the students have a good understanding of the concepts and principles. Therefore, in addition to lectures, the students will be also provided with supplementary course materials to read and homework to do at the end of each chapter. The students are required to submit homework report timely in order to obtain scores. The mid-term examination is designed to check the study progresses of each student so that some adjustment can be made based on student's performance. In addition, each student is required to conduct an independent soil quality evaluation project. For this project, students will select one of the soil quality related study areas (crop production-, animal production-, food safety-, environmental quality (water quality/air quality)-oriented soil quality issue), conduct a literature review based on journal articles, textbook chapters, and/or proceeding papers, discuss the characteristics of the concept/approach, its limitations, and benefits, submit a report, and present results of their independent study.

REFERENCES: Reference books, journal articles, and related information links are provided on course website and in disk (some references are listed at the end of this syllabus).

PREREQUISITES: Soil Science for Environmental Professionals (SWS 5050).

OFFICE HOURS

INSTRUCTOR: Open for e-mail and phone call at any time or chat room by appointment.

COURSE MODULES

1. Concepts, principles, and components of soil quality
   - 1.1. Definition and concepts of soil quality
   - 1.2. Soil components and basic soil quality properties
   - 1.3. Soil quality indicators
2. Methods of soil quality evaluation
   - 2.1. Soil quality assessment
   - 2.2. Measurements of soil quality indicators
3. Management of soil quality for agriculture and environmental quality
   - 3.1. Soil quality management for plant production
     - 3.1.1. Soil quality factors
     - 3.1.2. Processes and management
   - 3.2. Management of soil quality for the environment
     - 3.2.1. Water quality
     - 3.2.2. Air quality
4. Management of soil quality for health and food security
   - 4.1. Soil quality management for plant health
   - 4.2. Soil quality management for animal health
   - 4.3. Soil quality management for human health and food security

GRADES AND GRADE POINTS

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

ABSENCES AND MAKE-UP WORK

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

ACADEMIC HONESTY

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the

University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

STUDENT RESPONSIBILITIES
Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court.
More information about student responsibilities is available online at:
http://cals.ufl.edu/faculty-staff/docs/cc/forms/Syllabus%20Statements%2013-14.pdf

STUDENT COMPLAINTS
Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See http://distance.ufl.edu/student-complaints for more details.

CAMPUS HELPING RESOURCES
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,* **www.counseling.ufl.edu/cwc/**
  Counseling Services
  Groups and Workshops
  Outreach and Consultation
  Self-Help Library
  Wellness Coaching

- U Matter We Care, **www.umatter.ufl.edu/**

- *Career Resource Center,* First Floor JWRU, 392-1601, **www.crc.ufl.edu/**

SOFTWARE USE

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

SERVICES FOR STUDENTS WITH DISABILITIES

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, **www.dso.ufl.edu/drc/**

TOPIC OUTLINE OF SOIL QUALITY

Chapter 1. Definition and Concepts

1.1. What is soil quality?

Soil quality is the capacity of the soil to function within the ecosystem boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health (Soil Sci. Soc. Am, 1997). Soil quality is a measure of the conditions of soil relative to the requirement of one or more species and /or to any human need or purpose (Johnson et al., 1997; Lal, 1997; Doran et al., 1998). Soil quality consists of physical, chemical, and biological components.

1.2. Why do we need soil quality concept?

The importance of developing the concept of soil quality was enhanced because of the need to apply soil science to address the problems of nonagricultural uses of soil (e.g., mineland restoration, urban uses and disposal of urban wastes, soil contamination and pollution by industrial activities, athletic and recreational uses of soil, and environmental regulatory functions with particular reference to water quality and the greenhouse effect). A strong need, therefore, arose to develop appropriate indicators of soil quality in relation to specific soil function (e.g., agricultural, urban, industrial, recreational, athletic, environmental, and waste disposal).

1.3 How do we evaluate soil quality?

1.4 What are the potential applications of soil quality in agriculture, food and environment?

Chapter 2. Soil Components and Basic Soil Quality Properties

2.1. Soil development and quality changes

2.2. Soil components

2.2.1 Inorganic components

Primary minerals

Clay minerals

Oxides

2.2.2 Organic components

Organic matter

Humus

Soil organisms

2.3. General soil quality attributes

2.3.1 Soil texture

9.6 Optimal fertilization and irrigation
9.7 Soil quality evaluation for plant health

Chapter 10. Soil Quality Management for Animal Health
10.1 Essential elements for animal health and growth
10.2 Forage quality and animal production
10.3 Nutrient imbalance
10.4 Toxic effects of heavy metals
10.5 Other contaminants
10.6 Soil quality evaluation for animal health

Chapter 11. Soil Quality Management for Food Security
11.1 Food chain principles
11.2 Human nutrition and food
11.3 Food chain contamination: heavy metals and pesticides
11.4 Micro-nutrients, from soil to food
11.5 Soil quality management of quality food production
11.6 Soil quality evaluation for food security

BIBLIOGRAPHY

Soil Quality Websites: http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/

Books

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Journal Articles

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