

Lesson-Plan

School: Science

Department: Environmental Science

Course Code: ES 566

Course Name: Soil Science

Credit: 2 0 0 2

Instructors: Dr. Nayanmoni Gogoi, Dr. Santa Kalita, & Dr. S. S. Bhattacharya

Course coordinator: Dr. S. S. Bhattacharya

1. Abstract:

Soil plays a vital role in sustaining life and in biogeochemical cycles. This course will provide the basic understandings of the science of soils. The genesis and soil formation process, soil profile, soil colloidal substances, and soil reactions would be taught thoroughly. In addition, soil biology and significance of organic matter in hoarding C in soil would be taught with special reference to soil microorganisms and their activity. Moreover, highlighting the functional role of soil and vegetation management in combating climate change distortions is one of the integral parts of this course.

2. Objective:

The prime objective of the course is to provide the student a sound understanding of soil science with an exposure to the contemporary issues related environmental quality and climate change. In addition, lab based hands-on training will be provided for soil quality analysis.

3. Prerequisites of the course:

Basic knowledge in biology and chemistry would be helpful for understanding the course.

4. Course outline + suggested reading:

The course will start with lessons on soil genesis, formation, classification, physico-chemical compositions, essential nutrients & their functions, soil organic carbon and their fractions, organic matter breakdown, mineralization and immobilization, soil microorganisms. This part will be covered by 13-14 lectures. Simultaneously, practical classes will be conducted.

The next part will start with problem soils and their management, C:N ratio and soil quality factors, Relative importance of soil and vegetation management in global warming and climate change,. This part will be covered in 13-14 lectures.

Reference/Text books:

1. The Nature and Properties of Soils. Nyle C. Brady & Ray R. Weil, Prentice Hall; 14 edition (September 16, 2007)
2. Stewart B.A., Advances in soil sciences, Lewis Publisher, 2000.
3. Biswas T.D. and Mukherjee S.K., Textbook of Soil Sciences, Publisher: McGraw-Hill Inc.,US, 2nd edition, 1995.

5. (a) Lesson Plan (THEORY):

Chapter/Topic	Hours
Introduction	1
Soil Formation: Weathering- and Soil formation - Profile development - Soil composition. Soil forming rocks and minerals - Classification	4
Soil physics: Soil separates and particle size distribution - Soil texture and structure - Bulk density, particle density, pore space	3
soil air, soil temperature, soil water, soil consistence - Significance of physical properties to plant growth	2
Soil chemistry: Soil colloids - Inorganic colloids - Clay minerals - amorphous - Ion exchange reactions - Organic colloids	4
TEST I	20 min.
Soil reaction- pH, Eh, CEC, base saturation –problem soils (acid, alkaline and sodic soils)	4
Test II (Mid term)	
Soil biology: Soil organic matter - Decomposition - Humus formation - Significance on soil fertility, nutrient availability	2
Soil microorganisms and their roles in soil quality.-C:N ratio	2
TEST III	20 min.
Soil and climate change: effects of global warming on soils and its management	2
Relative importance of soil and vegetation management in global warming	3
Test IV (End term- theory)	--
TOTAL	28

Lesson Plan (PRACTICAL)

Chapter/Topic	Hours
Assessment of soil pH and EC	1
Assessment of Water Holding Capacity, Bulk Density, Particle Density, and Porosity	3
Assessment of available sulphur and phosphorous	6
Assessment of soil (i.e microbial) respiration	2
Practical examination (End term - theory)	---

(b) Evaluation plan:

Evaluation plan:

Performance of the student is evaluated on the basis of the following continuous assessment

Two Tests (Test I & III) will carry 20 marks each, hence total = 40 marks and

Test II (mid term) will carry 40 marks & Test IV (End term - theory) will carry 60 marks respectively and the practical examination will carry 50 marks.

6. Pedagogy:

- Lecture presentations: Blackboard supplemented by power point presentation
- Regular class room interaction between students and teacher
- Group discussion with case studies
- Lab

7. Expected outcome:

On completion of the course, the students are expected to have a thorough understanding of soil science.