

Course title: Soil Science				
Course code: NRE 130		No. of credits: 3	L-T-P: 28-12-10	Learning hours: 45
Pre-requisite course code and title (if any):				
Department: Natural and Applied Sciences				
Course coordinator: Dr Chandrashekhar Azad Vishwakarma			Course instructor: Dr Chandrashekhar Azad Vishwakarma	
Contact details: chandrashekhar.vishwakarma@terisas.ac.in				
Course type: Elective			Course offered in: Semester 2	
Course Description The course will help students to understand soil's physical attributes, biological composition, and chemical makeup. This knowledge will help them to solve range of soil management issues. The course will equip students to conservationist to replenish degraded ecosystem.				
Course objectives				
<ul style="list-style-type: none"> To provide skillsets related to monitoring the properties of soil Imparting knowledge related to agriculture management techniques and conservation of natural resources 				
Course content				
Module	Topic	L	T	P
1.	Soil physical and chemical properties: soil formation and distribution; mobility of nutrient and trace elements during soil genesis; paedogenic evolution and inherent soil nutrient cycle benefits, which enhances its sink and source role	5	4	
2.	Soil biology and biochemistry: fundamental biological and biochemical features and processes occurring in soil systems	5	4	
3.	Soil erosion and conservation: soil erosion and effects of modern agriculture on soil geochemistry, introduction to different conservation and soil remediation practices and reflection on forest ecosystems	13		
4.	Soil pollution: Interactions between industrial effluents and soils; soil contamination with radionuclides.	5	4	
5.	Practicals: <ul style="list-style-type: none"> Determination of soil colour by Munsell soil colour chart in field Determination of bulk density (clod coating method) and particle density by pycnometer method and porosity of soil Determination of soil texture by feel method and sieve analysis Determination of soil texture by Bouyoucos hydrometer method Determination of infiltration rate of soil by double ring infiltrometer Determination of pH, conductivity and anion/cation exchange capacity of soil Study of soil map 			10
		25	12	10
Evaluation criteria				
All written submissions:				
Test 1: 30%, Written examination , to assess understanding of soil properties, and processes of soil systems. Evaluation is linked to Module 1&2.				
Test 2: 30%, Written Assignment and Presentation ; to increasing understanding of the latest research in the fields of soil erosion and conservation and impact of soil pollution due to contamination. Evaluation linked to learning from Module 3&4.				
Test 3: 50%, Practical submissions and viva , soil samples to be evaluated from nearby ecosystems including forests, urban watersheds and agriculture fields. Evaluation linked to module 5				
Learning outcomes				
On successfully completing this course the students will be able to:				
<ul style="list-style-type: none"> Examine physico-chemical, mineralogical and biological properties of various types of soil Assess impact on soil nutrient cycle due to soil erosion and soil pollution and soil remediation techniques and conservation practices Assess soil health, to reflect on soil's contribution to its sink and source role and compare with soils which support forest ecosystems and natural vegetation 				

Pedagogical approach

Classroom lectures, tutorials and practical

Materials & Required text

Fundamentals of Soil Science, 8ed by Henry D Foth, John Wiley

Fundamentals of Soil Science by Indian Society of Soil Science (ISSS)

Tan, K.H., 2009. *Environmental soil science*. CRC Press.

Rowell, D.L., 2014. *Soil science: Methods & applications*. Routledge.

Journals

Soil biology and biochemistry

Soil research

Journal of Soil and Water Conservation

Indian Journal of Soil Conservation

Soil biology and biochemistry

Soil research

Catena

Sedimentology

Journal of sedimentary research

Additional information (if any)**Student responsibilities**

Meeting deadlines for assignment submissions, attending regular classes

Course Reviewers:

1. Dr. Anshumali, Associate Professor, Indian School of Mines, Department of Environmental Science and Engineering, Indian Institute of Technology (ISM) Dhanbad
2. Dr. Abhay Kumar Singh, Sr. Principal Scientist, Central Institute of Mining and Fuel Research, Dhanbad