SOIL SCIENCE AND TECHNOLOGY

PROF. SOMSUBHRA CHAKRABORTY
Department of Agricultural & Food Engineering
IIT Kharagpur

INTENDED AUDIENCE : Agriculture, Environmental science, Agricultural engineering

INDUSTRIES APPLICABLE TO :
1. Fertilizer companies
2. Soil testing services
3. Soil and environmental pollution consulting companies
4. Soil remote sensing solution services

COURSE OUTLINE :

This core course is aimed to provide a basic understanding of various aspects of soil science along with some state-of-the-art technologies. The objective is to provide knowledge of different physical and chemical properties of soil. Most importantly this course will impart different preparatory and exploratory data analysis approaches for unconventional digital soil mapping, modeling and mapping of continuous and categorical soil attributes, hyperspectral and proximal soil sensors and their applications for modeling of soil properties, soil pollution and remediation which are not covered in the traditional courses of soil science.

ABOUT INSTRUCTOR :

Prof. Somsubhra Chakraborty am currently serving as an Assistant Professor (Soil Science) at the Agricultural and Food Engineering Department, Indian Institute of Technology Kharagpur. I was awarded various prestigious fellowships including the Australia Awards Fellowship from the Australian Department of Foreign Affairs and Trade. I did my undergraduate and M.Sc degrees from BCKV and PAU in India and PhD degree in Agronomy (Soil Science emphasis) from Louisiana State University, USA. I started my career as a post-doctoral researcher at West Virginia University, USA. I joined IITKgp as faculty in 2016. I am passionate about the use of proximal and non-invasive sensors for soil management. I have more than 40 international journal publications. I am currently serving as the member of the editorial board of Geoderma, the global journal of soil science.

COURSE PLAN :

Week 1: Basic Overview Of Soil; Ecosystem Services Of Soils; Weathering; Soil Formation; Soil Profile
Week 2: Soil Taxonomy; Soil Orders-1; Soil Orders-2; Soil Colour And Soil Texture; Soil Structure
Week 3: Soil Tillage And Soil Density; Soil Porosity And Consistency; Soil Water Energy Concepts; Measurement Of Soil Water; Tutorial
Week 4: The Flow Of Liquid Water Into Soil; Qualitative Description Of Soil Wetness; Soil Air; Soil Temprature; Tutorial
Week 5: Silicate Clays-1; Silicate Clays -2; Sources Of Charges On Soil Colloids; Cation Exchange Capacity; Sorption Of Pesticides In Soil
Week 6: Diffuse Double Layer Theories; Adsorption Isotherms; Soil Acidity; Soil Alkalinity And Salinity; Submerged Soils
Week 7: Essential Plant Nutrients; Soil Nitrogen; Biological Nitrogen Fixation; Soil Phosphorus And Potassium; Fertilizers
Week 8: Soil Testing-1; Soil Testing-2; Soil Organic Matter And Climate Change; Soil Organisms; Compost
Week 9: Soil Erosion And Land Degradation; The Universal Soil-loss Equation; Conservation Tillage; Wind And Tillage Erosion; Toxic Organic Chemicals In Soils
Week 10: Remediation Of Soil Organic Pollution; Soil Contamination With Toxic Inorganic Substances; Remediation Of Soil Inorganic Pollution; Soil Survey; Remote Sensing In Soil Survey
Week 11: Gis And Gps; Geostatistics; Basics Of Diffuse Reflectance Spectroscopy; Diffuse Reflectance Spectroscopy For Soils; Pxrf Soil Applications Overview Of Digital Soil Mapping; Modeling And Mapping Of Continuouos Variables; Modeling And Mapping Of Categorical
Week 12: Variables; Pedotrasnfer Functions; Accuracy And Uncertainity Of Dsm