E003: Landscape ecology, GIS and Remote Sensing of the Environment

Instructors: Muneeswaran M. (muneeswaran.m@atree.org), Jagdish Krishnaswamy & Tanya Bhowmick

Credits: 3 (48 contact hours)

Hours per week: Two hours of lectures on Wednesdays and One lab session of three hours on Thursdays.

Description

This course will provide a basic introduction to concepts of landscape ecology and practical applications of Geographical Information Systems (GIS) and satellite remote sensing (RS) for environmental applications, with a special focus on the remote sensing of vegetation/land-cover. It is intended to provide you with the background information and hands-on skills necessary to successfully link landscape ecology, remotely sensed imagery and GIS and RS applications with social-ecological and environmental field datasets to answer research questions related to ecology, conservation and sustainable development. The course will aim to provide a basic understanding of the theoretical basis for landscape processes, issues of temporal and spatial scale, data collection and analysis, as well as a broad overview of various approaches that enable interpretation of these data for understanding the drivers, processes and outcomes of ecological and environmental change in different contexts. It will equip students with basic skills in applying GIS and RS using QGIS and IDRISI and R statistical software.

Prerequisites: Basic knowledge of computers, basic mathematical skills (should have cleared ATREE C0 course).

Course format: 27 hours of theory (including paper critiques by students); 42 hours of lab tutorials; 18 hours of project hours.

The course assessment format will be:
10% class participation
10% paper critique presentation
40% - 2 quizzes (1-theory, 1-lab)
40% final project (submit as soft copy report)

Schedule: Wednesdays (10:00-11:50) and Thursdays (2:00-5:00)

	Date	*Faculty/ Lab Staff*	*Lecture/ Lab*	*Topic*
1	3-Aug-16	Jagdish/ Munees	Lecture	Overview of Course & Introduction to GIS (Raster & Vector)
2	3-Aug-16	Sharad	Lecture	Projections and Datum
3	4-Aug-16	Munees/Tania	Lab	Introduction to QGIS; Vector data types; digitization
4	10-Aug-16	Munees	Lecture	Topology, spatial operations (measurement, classification, polygon overlay and buffering)
5	10-Aug-16	Jagdish	Lecture	Introduction to RS: electromagnetic spectrum, & reflectance of various Landuses
6	11-Aug-16	Munees/Tania	Lab	Vector data analysis - Exploring QGIS Vector Tools
7	17-Aug-16	Munees	Lecture	Resolution: spatial, spectral, temporal, radiometric
8	17-Aug-16	Tania		Satellite image platforms and satellite datasets
9	18-Aug-16	Munees/Tania	Lab	Exploring QGIS- Geoprocessing & Geometry
10	24-Aug-16	Munees	Lecture	Very high spatial resolution datasets, Hyperspectral data & Lidar data– uses and limitations
11	24-Aug-16	Munees	Lecture	Pre-processing (e.g., atmospheric correction) and image enhancement
12	25-Aug-16	Munees/Tania	Lab	Exploring Raster Tools
13	31-Aug-16	Munees	Lecture	Visual Interpretation, Key elements
14	31-Aug-16	Munees	Lecture	Classification including visual, unsupervised, supervised
15	1-Sep-16	Munees/Tania	Lab	GPS application
16	7-Sep-16	Munees	Lecture	Object oriented classification
17	7-Sep-16	Tania	Lecture	Change detection and analysis
18	8-Sep-16	Munees/Tania	Lab	Web GIS Intro -Open layers, WMS & google my map
19	14-Sep-16	Jagdish	Lecture	Vegetation and soil indices
20	14-Sep-16	Jagdish	Lecture	Introduction to Landscape ecology
21	15-Sep-16	Munees/Tania	Lab	Intro to IDRISI
22	21-Sep-16	Shiv Subramanya	Lecture	Web GIS introduction
23	21-Sep-16	Shiv Subramanya	Lecture	Web GIS introduction
24	22-Sep-16	Munees/Tania	Lab	Atmospheric and radiometric calibration
25	28-Sep-16	Jagdish	Lecture	Spatial and temporal analysis
26	28-Sep-16	Soubadra	Lecture	Fragstat-applications
27	29-Sep-16	Munees/Tania	Lab	Indices, Unsupervised & Supervised classification
28	5-Oct-16	Jagdish	Lecture	Applications: biodiversity assessment using RS/GIS - case 2

29	5-Oct-16	Sharad	Lecture	Application in forest sector: linking forest condition to socio-economic variables
30	6-Oct-16	Munees/Tania	Lab	Change detection
31	12-Oct-16	Harini	Lecture	Applications: biodiversity assessment using RS/GIS - case 1
32	12-Oct-16	Jagdish	Lecture	Application: mapping extreme rain events and generating vulnerability maps
33	13-Oct-16	Munees/Tania	Lab	Accuracy Estimation
34	19-Oct-16	Shrinivas -Feral	Lecture	Using Quantum GIS in your workflow
35	19-Oct-16	Shrinivas -Feral	Lecture	Applications: Analyzing Veg patterns and dynamics using RS data
36	20-Oct-16	Munees/Tania	Lab	Map composition LAB
37	26-Oct-16	Sharad	Lecture	Application in water sector: Irrigated area mapping with RS/GIS
38	26-Oct-16	Sharad	Lecture	Application in water sector: Irrigated area mapping with RS/GIS
39	27-Oct-16	Munees/Tania	Lab	Project
40	2-Nov-16	***TBA***	Lecture	Student critiques of papers
41	2-Nov-16	***TBA***	Lecture	Student critiques of papers
42	3-Nov-16	Munees/Tania	Lab	Lab Quiz
43	9-Nov-16	Aravind	Lecture	Applications of RS in Niche Modelling
44	9-Nov-16	***TBA***	Lecture	Theory Quiz
45	10-Nov-16	Munees/Tania	Lab	Students project
46	16-Nov-16	***TBA***	Lecture	Students project
47	16-Nov-16	***TBA***	Lecture	Students project
48	17-Nov-16	***TBA***	Lab	Students project