E3:Landscape ecology, GIS and Remote Sensing of the Environment

Course type: Elective

Year: 2013-14, Semester II

Credits: 3

Course instructors: Jagdish Krishnaswamy, Sharad Lele, Muneeswaran M.

Synopsis: 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% - 4 quizzes (2-theory, 2-lab)
40% final project (submit as soft copy report)

Session-wise schedule

Date	*Faculty/ Lab Staff*	*Lecture/ Lab*	*Topic*	*Time*
21-Jan-14	**Jagdish/ Munees**	Lecture	Overview of Course & Introduction to GIS (Raster&Vector)	12:00-12:50
22-Jan-14	**Munees/Jaya**	Lab	Introduction to QGIS;Vector data types; digitization	02:00-5:00
22-Jan-14	**Munees**	Lecture	Topology, spatial operations (measurement, classification, polygon overlay, buffering)	12:00-12:50
28-Jan-14	**Sharad**	Lecture	Projections and Datums	12:00-12:50
28-Jan-14	**Munees/Jaya**	Lab	Vector processing and advanced querying	
29-Jan-14	**Munees/Jaya**	Lab	GPS, projection and georectification	02:00-5:00
29-Jan-14	**Jagdish**	Lecture	Introduction to RS: electromagnetic spectrum, & reflectance of various landuses	12:00-12:50
04-Feb-14	**Munees**	Lecture	Resolution: spatial, spectral, temporal, radiometric	12:00-12:50
05-Feb-14	**Munees/Jaya**	Lab	Intro to IDRISI; Raster data structure;platforms;Image display and visualization	02:00-5:00
05-Feb-14	**Munees**	Lecture	Optical and radar satellite image platforms and satellite datasets	12:00-12:50
11-Feb-14	**Munees**	Lecture	Preprocessing (e.g., atmospheric correction) and image enhancement	12:00-12:50
12-Feb-14	**Munees/Ameya**	Lab	atmospheric and radiometric calibration	02:00-5:00
12-Feb-14	**Munees/SL**	Lecture	Classification including visual, unsupervised, supervised	12:00-12:50
19-Feb-14	**Munees/Ameya**	Lab	Unsupervised & Supervised classification	02:00-5:00
19-Feb-14	**Jagdish**	Lecture	Classification including visual, unsupervised, supervised (accuracy assessment)	12:00-12:50
18-Feb-14	**Munees**	Lecture	Fuzzy and object oriented classification	12:00-12:50
04-Mar-14	**Jagdish**	Lecture	Vegetation and soil indices	12:00-12:50
05-Mar-14	**Munees/Jaya**	Lab	Indices	02:00-5:00
05-Mar-14	**Munees**	Lecture	Change detection and analysis	12:00-12:50
11-Mar-14	**Munees**	Lecture	Very high spatial resolution datasets,Hyperspectral data & Lidar data– uses and limitations	12:00-12:50
12-Mar-14	**Munees/Ameya**	Lab	Fuzzy and object oriented classification	02:00-5:00
12-Mar-14	**Jagdish**	Lecture	Introduction to Landscape ecology	12:00-12:50
18-Mar-14	**Jagdish**	Lecture	Spatial and temporal scales in Landscape ecology	12:00-12:50
19-Mar-14	**Munees/Ameya**	Lab	Applying Landscape ecology concepts	02:00-5:00
19-Mar-14	**Jagdish**	Lecture	Spatial and temporal analysis	12:00-12:50
25-Mar-14	**Harini**	Lecture	Applications: biodiversity assessment using RS/GIS -case 1	12:00-12:50
26-Mar-14	**Munees/Ameya**	Lab	Change detection	02:00-5:00
26-Mar-14	**Jagdish**	Lecture	Applications: biodiversity assessment using RS/GIS - case 2	12:00-12:50
01-Apr-14	**SHARAD**	Lecture	Application in forest sector: linking forest	12:00-12:50

Date	*Faculty/ Lab Staff*	*Lecture/ Lab*	*Topic*	*Time*
			condition to socio-economic variables	
02-Apr-14	**Munees/Ameya**	Lab	Spatial and temporal scales in Landscape ecology	02:00-5:00
02-Apr-14	**SHARAD**	Lecture	Application in water sector: Irrigated area mapping with RS/GIS	12:00-12:50
08-Apr-14	**Jagdish**	Lecture	Application: mapping extreme rain events and generating vulnerability maps	12:00-12:50
09-Apr-14	**Munees/Jaya**	Lab	Web GIS Intro	02:00-5:00
09-Apr-14	**Munees**	Lecture	Application: carbon estimation with LIDAR	12:00-12:50
15-Apr-14	**Jagdish**	Lecture	Applications: Analyzing Veg patterns and dynamics using RS data	12:00-12:50
16-Apr-14	**Munees/Jaya**	Lab	Map composition LAB	02:00-5:00
16-Apr-14	**FERAL**	Lecture	Applications: Analyzing Veg patterns and dynamics using RS data	12:00-12:50
22-Apr-14	**TBA**	Lecture	Applications: TBA	12:00-12:50
23-Apr-14	**Jaya/Ameya**	Lab	Project (2 slots in the week)	02:00-5:00
23-Apr-14	**JK/SL/M**	Lecture	Student critiques of papers	12:00-12:50
29-Apr-14	**JK/SL/M**	Lecture	Student critiques of papers	12:00-12:50
30-Apr-14	**Jaya/Ameya**	Lab	Project (2 slots in the week)	02:00-5:00
30-Apr-14	**JK/SL/M**	Lecture	Student critiques of papers	12:00-12:50

NOTE: dates for 2 lab sessions and 2 student project work slots yet to be finalized.