Course title: Geo-informatics for water resources

Course code: WSW 172	**No. of credits:** 4	**L-T-P distribution:** 34-11-11	**Learning hours:** 56

Pre-requisite course code and title (if any):

Department: Department of Regional Water Studies

Course coordinator(s): Dr Rinki Deo | **Course instructor(s):** Dr. Rinki Deo

Contact details:

Course type: Compulsory Core | **Course offered in:** Semester 1

Course description:
This course introduces the participants to the fundamentals of geospatial technology (Remote sensing, GIS and GPS) .This course is intended to introduce the application RS&GIS techniques in water resources management

Course objectives:
To provide a strong fundamental understanding of the GIS and remote sensing technologies. To understand the basic principle underlying the GIS/model-based management of water resources and environment

Course contents

Module	**Topic**	**L**	**T**	**P**
1	Elements of Surveying- Basic Principle of Surveying, Types of surveying, Levelling, Minor Instruments of surveying, Introduction to Remote Sensing: Electromagnetic Radiation (EMR), EMR Spectrum and its Properties EMR wavelength regions and their Applications, Atmospheric windows, Interaction of EMR with Atmosphere and the Surface, Sensors and satellites, Resolutions: Spectral, Spatial, Temporal and Radiometric, Digital Image: display and its properties, Spectral signatures, Vegetation and Bare soil, Introduction to Photogrammetry.	14	2	6
2	Introduction to Geographical information system, concept of spatial and non-spatial data, GIS data model: Raster and Vector, Map: Scale, Projection and Datum, Map design, Map: Rectification and Geo-referencing, Introduction to GPS, Spatial data: Entry and editing (Digitization)	12	2	6
3	GIS and Remote Sensing Applications for the Water Sector: Digital elevation models and its applications, Map algebra: Local, Neighbourhood, Zonal operations, Extraction of water info using band combination, Extraction of water info from topographical maps, Digital Image Classification: land use / land cover mapping.	8	4	10
4	Application of RS/GIS in water resource management Case studies (national/international initiatives)	0	3	0
	Total	**34**	**11**	**22**

Evaluation criteria
2 minor tests: 10% each
Practical: 30%
Tutorial: 10%
End-term exam: 40%

Learning outcomes:
Upon completion of this course, a fully-engaged student will be able to understand the fundamentals of geoinformatics water resources studies.

Pedagogical approach
Classroom teaching will involve black board, power point presentations, and case study analysis. The sessions will be interactive and students will be expected to make presentations. Lab activities and demonstration for better understanding of theory

Materials

Suggested Readings:
Jensen J. R, Remote Sensing of the Environment: An Earth Resource Perspective, Pearsons, 2009.
Lillesand T, Kiefer RW and Chipman J, Remote Sensing and Image Interpretation, Wiley &Sons. 2009.
Chang K., Introduction to Geographic Information Systems, McGraw-Hill, New York, 2006.
Ebgman, E.T., and R.J. Gurney. (1991) Remote sensing in hydrology. London, Chapman and Hall
Shamsi UM, GIS Applications for Water, Wastewater, and Stormwater Systems, Taylor and Francis, 2005
Lyon JG GIS for Water Resources and Watershed Management
Chen Y, GIS and Remote Sensing in Hydrology, Water Resources and Environment, 2004

Additional information (if any)
Student responsibilities Classes will be interactive. Students are expected to be regular in attendance, participation, and submission of assignments. They must come prepared with readings when required.

Course reviewers:

1. Dr. S.P.Aggarwal, FIE, Scientist/Engineer "SG" & Head, Water Resources Department, ,Indian Institute of Remote Sensing, ISRO| Dept. of Space| Govt. of India, 4, Kalidas Road, Dehradun, Uttarakhand - 248 001 | India
2. Dr. Vaibhav Garg, Scientist/Engineer 'SD' Water Resources Department, Earth Resources & System Studies Group, Indian Institute of Remote Sensing-Dehradun, Indian Space Research Organization, 4, Kalidas Road | Dehradun | Uttarakhand - 248 001 | India