DEPARTMENT OF GEOLOGY
SEMESTER – VI
BSC (H) Geology
Category - I

DISCIPLINE SPECIFIC CORE COURSE - DSC – 16: Remote Sensing and GIS (L3, P1)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSC – 16: Remote Sensing and GIS (L3, P1)	**4**	**3**	**0**	**1**	**12th pass with science**	**Studied Earth System Science and Equivalent**

Learning Objectives

This course is intended to provide basic understanding of remote sensing, geographic information system and photogrammetry. The course also aims to familiarize the students with utilization of geo-processing tools in the field of geosciences.

Learning outcomes

After completing this course, the students will understand the basics of remote sensing and GIS techniques and their applications in various fields of the Earth Sciences. They will be able to utilize open source image processing and GIS software to make basic image correction and thematic maps. They will be able to integrate the GNSS and field-based data with the GIS to create maps for further analysis.

SYLLABUS OF DSC-16
Theory (45 hours)

UNIT – I (12 hours)

Detailed content

Fundamentals of remote sensing: Concept of remote sensing, electromagnetic spectrum, atmospheric windows, remote sensing system, sensors and scanners, remote sensing platforms, image resolution, data procurement, data formats- raster and vector, digital image processing.

UNIT – II (12 hours)

Detailed contents

Photogeology: Types and acquisition of aerial photographs, concept of scale and resolution; Principles of stereoscopy, relief displacement, vertical exaggeration and distortion. Elements of air photo interpretation, identification of the primary and secondary structures of rocks, lithology, landforms and surface processes.

UNIT – III (11 hours)

Detailed contents

Geographic Information System (GIS): Introduction to GIS, datum, coordinate systems and projection systems, spatial data models and data editing. Introduction to digital elevation model (DEM) analysis. Spatial and Temporal interpolation of datasets.

UNIT – IV (10 hours))
Detailed contents
Global navigation satellite systems (GNSS): Introduction to GNSS, GPS, GPS signals. Integrating GNSS data with GIS; GNSS applications in earth system sciences and disaster studies.

Practical Component- (30 Hours)
Introduction to QGIS software, plugins in QGIS, data procurement, creating FCC from raw data, Registration of satellite images, Image enhancement, Classification of images (Visual interpretation), Classification of images (Supervised and Unsupervised), Identification of geological structures, landforms and surface processes. Stereo viewing of images. Vector data editing, Generating slope map, aspect map and drainage network map, Spatial interpolation of datasets, Introduction to GPS.

Essential/recommended readings
Gupta, R.P. Remote Sensing Geology, Springer
Bhatta, B., Remote Sensing and GIS, 2nd Edition, Oxford.
Joseph, G., and Jeganathan, C., Fundamental of Remote Sensing, University Press, Hyderabad.

Suggestive readings
Gupta, R.P. Remote Sensing Geology, Springer
Joseph, G., and Jeganathan, C., Fundamental of Remote Sensing, University Press, Hyderabad.
Demers, M.N., 1997. Fundamentals of Geographic Information System, John Wiley & sons. Inc.
Hoffmann-Wellenhof, B., Lichtenegger, H. and Collins, J., 2001. GPS: Theory & Practice, Springer Wien New York.
Jensen, J.R., 1996. Introductory Digital Image Processing: A Remote Sensing Perspective, Springer-Verlag.
Lillesand, T. M. & Kiefer, R.W., 2007. Remote Sensing and Image Interpretation, Wiley.
Richards, J.A. and Jia, X., 1999. Remote Sensing Digital Image Analysis, Springer-Verlag.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.