

## **Approval: 9<sup>th</sup> Senate Meeting**

**Course Number:** CE 601

**Course Name:** Geo-Informatics

**Credits:** 2-0-2-3

**Pre-requisite:** CE 508 - Photogeology and Photogrammetry; CE 501 - Remote Sensing

**Intended for:** B.Tech. 4<sup>th</sup> year/M.S./M.Tech./Ph.D.

**Distribution:** Elective

**Semester:** Odd/Even

**Preamble:** Currently GIS is being extensively used in many projects and various disciplines. It has become absolutely necessary in the planning of engineering projects (forest roads, dams, etc.) and various other projects pertaining to exploration and exploitation themes. Hence this course is designed where a student gets to know the basics of Geoinformatics, its components and how to process the data and finally its analysis. Students will be given hands-on practice on this software which is compulsory for understanding the theoretical components.

**Course Outline:** Geo-informatics is an emerging field which can be applied to various fields in relation to their geographical locations to carry out the spatial studies. The objective of the course is to give an introduction about GIS, its principle and application in various fields. It will give knowledge and hands-on practice on GIS software that are extensively used in industries. That's why this course is designed for 2-0-2 format where one lab of minimum 2 hours is required to practice the things learnt in theoretical class. Finally students will carry out a small project either individually or in teams within the semester.

### **Course Modules:**

- 1 Introduction, concepts and terminology, GIS packages & components of GIS, difference between image processing system and GIS. **(5 contact hours)**
- 2 Elements of Image interpretation, Image formats, Raster and vector data, Data acquisition through scanners and digitizers, methods of digitization. **(5 contact hours)**
- 4 Digital Data: spatial & non-spatial; preprocessing, spatial referencing and positioning, rectification and registration, interpolation **(10 contact hours)**
- 5 Database structure – Hierarchical data, network systems, relational database, and data management in GIS **(3 contact hours)**
- 6 Data visualization, data manipulation, overlay, buffering, interpolation, query analysis, mathematical operations on data. **(9 contact hours)**
- 7 Project based application of GIS for various natural resources mapping & monitoring and for engineering applications **(10 contact hours)**

**Text Books:**

- a) Kang-Tsung Chang, 'Introduction to geographic information systems – 8<sup>th</sup> Ed.', McGraw-Hill Education, 2015.
- b) JR Jensen, and RR Jensen, 'Geographic information systems : Exercise workbook', Pearson College Division, USA, 2013.
- c) M A. Gomasasca, 'Basics of Geomatics', Springer, 2009.
- d) P A. Longley, M Goodchild, D J. Maguire, D W. Rhind, 'Geographic Information Systems and Science - 3<sup>rd</sup> Ed.', John Wiley, 2010.

**Reference Books:**

- a) P.A. Burrough, and R.A., McDonnell, 'Principles of Geographic Information for Land Resources Assessment', Oxford University Press, USA, 1998.
- b) M.N., DeMers, 'Fundamentals of Geographic Information System - 3<sup>rd</sup> Ed.', John Wiley, 2008.
- c) M. Neteler, and H. Mitasova, 'Open source GIS : GRASS GIS approach', Springer, 2008.
- d) R S. Lunetta, J G. Lyon, 'Remote Sensing and GIS Accuracy Assessment', CRC Press, UK, 2005