

# Geoinformatics

|                              |                            |
|------------------------------|----------------------------|
| <b>Course Code</b><br>CE-288 | <b>Credit Hours</b><br>1-1 |
|------------------------------|----------------------------|

## Course Description

This course is designed to familiarise the students of Civil Engineering with the field of Geoinformatics which has at its core the technologies supporting the processes of acquiring, analysing and visualizing spatial data. This includes Field Surveying, Photogrammetry, Geographic Information System (GIS), Global Navigation Satellite System (GNSS) and Remote Sensing. However in this course the students will be only studying introductory topics on remote sensing, GIS and GNSS.

## Text Book:

1. Kang-Tsung Chang '*Introduction to Geographic Information Systems*' McGrath Hill International Edition, Fourth Edition.
2. Thomas, M. Lillesand & Ralph W. Kiefer (2005), '*Remote Sensing and Image Interpretation*', 5th edition, John Wiley & Sons, Inc.
3. M Anji Reddy (2008) '*Remote Sensing and Geographical Information Systems*', 3rd edition, BS publications.
4. Leick, Alfred. '*GPS satellite surveying*', 3rd ed. JohnWiley & Sons, 2004.

## Reference Book:

1. Michael Kennedy (2002), *The Global Positioning System and GIS: An Introduction* 2nd Edition, Taylor & Frances, New York.
2. Elliott D. Kaplan, Christopher J. Hegarty, '*Understanding GPS: principles and applications*', 2<sup>nd</sup> Edition.
3. Clarke, K.(2004) *Getting Started with Geographic Information System*, Prentices Hall, New York, Second Edition.

## Prerequisites:

Nil.

## ASSESSMENT SYSTEM FOR THEORY

|             | <b>Without Project (%)</b> | <b>With Project/Complex Engineering Problems (%)</b> |
|-------------|----------------------------|------------------------------------------------------|
| Quizzes     | 15                         | 10-15                                                |
| Assignments | 10                         | 5-10                                                 |
| Mid Terms   | 25                         | 25                                                   |

|                   |    |       |
|-------------------|----|-------|
| Project           | -  | 5-10  |
| End Semester Exam | 50 | 45-50 |

### **ASSESSMENT SYSTEM FOR LAB**

|                                                      |     |
|------------------------------------------------------|-----|
| Lab Work/ Psychomotor Assessment/ Lab Reports        | 70% |
| Lab Project/ Open Ended Lab Report/ Assignment/ Quiz | 10% |
| Final Assesment/ Viva                                | 20% |

### **Teaching Plan**

| <b>Week No</b> | <b>Topics/Learning Outcomes</b>                                                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1              | Introduction to remote sensing                                                                                                     |
| 2              | Remote sensing basic process, electromagnetic radiations (EMRs) and spectrum, interaction of EMRs with atmosphere & Earth features |
| 3              | Satellite image resolutions                                                                                                        |
| 4              | Remote sensing sensors and platforms                                                                                               |
| 5-6            | Visual image interpretation and classification                                                                                     |
| 7              | Introduction to GIS                                                                                                                |
| 8              | Image map projections                                                                                                              |
| 9              | Datum's and map projections                                                                                                        |
| 10             | GIS data types                                                                                                                     |
| 11-12          | GIS/Spatial analysis                                                                                                               |
| 13             | GIS data sources and preparations                                                                                                  |
| 14             | Applications of GIS                                                                                                                |
| 15             | Fundamentals and operations of Global Navigation Satellite System (GNSS)                                                           |
| 16             | Spatial data work flow and case studies                                                                                            |
| 17-18          | An End Semester Exam of 3 hour will be taken encompassing all the topics covered during the semester.                              |

### **Practical**

| <b>Experiment No</b> | <b>Description</b>                            |
|----------------------|-----------------------------------------------|
| 1                    | Exploring the ERDAS Imagine                   |
| 2                    | ERDAS Imagine basic functionalities           |
| 3                    | Stack, subset and mosaic of satellite imagery |
| 4                    | Supervised classification of satellite image  |
| 5                    | Introduction to ArcCatalog and ArcMap         |
| 6                    | Map geo-referencing                           |
| 7                    | Database querying                             |
| 7                    | Creating features in ArcGIS                   |

|    |                                 |
|----|---------------------------------|
| 8  | Editing features and attributes |
| 9  | Making maps from templates      |
| 10 | Developing of GIS project       |