

Geographical Information System (CSC-459)
Tribhuvan University
Institute of Science and Technology
Bachelor of Science in Computer Science and Information Technology
Soch College of Information Technology

Course Title: Geographical Information System

Course no.: CSC-459 ----- **Full Marks:** 60+20+20

Credit Hours: 3 ----- **Pass Marks:** 24+8+8

Nature of Course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Basic concept of Geographical Information System

Goal: The course covers about spatial data modeling and database design, capturing the real world, spatial analysis and visualization, overview of open GIS

Course Contents:

Unit 1: Introduction -----6 Hrs.

- 1.1 Overview, History and concept of GIS
- 1.2 Scope and application areas of GIS
- 1.3 Purpose and benefits of GIS
- 1.4 Functional components of GIS
- 1.5 Importance of GPS and remote sensing data in GIS

Unit 2: Digital Mapping Concept ----- 3 Hrs.

- 2.1 Map Concept: map elements, map layers, map scales and representation
- 2.2 Map projection: coordinates system and projection system

Unit 3: Spatial Data Modeling and Database Design-----9 Hrs.

- 3.1 Introduction to geographic phenomena and data modeling
- 3.2 Spatial relationship and topology
- 3.3 Scale and resolution
- 3.4 Vector, raster and digital terrain model
- 3.5 Spatial database design with the concept of geo-database

Unit 4: Capturing the Real World ----- 8 Hrs.

- 4.1 Different Methods of data capture
- 4.2 Map projection and spatial reference
- 4.3 Data Preparation, Conversion and Integration
- 4.4 Quality aspects of Spatial Data
- 4.5 GPS
- 4.6 Remote Sensing

Unit 5: Spatial Analysis and Visualization ----- 7 Hrs.

5.1 Spatial Analysis

5.1.1 Overlay

5.1.2 Buffering

5.2 Map outputs and its basic elements

Unit 6: Introduction to Spatial Data Infrastructure ----- 8 Hrs.

6.1 SDI Concepts and its current trend

6.2 The concept of metadata and clearing house

6.3 Critical factors around SDIs

Unit 7: Open GIS ----- 4 Hrs.

7.1 Introduction of Open Concept in GIS

7.2 Open Source Software for Spatial Data Analysis

7.3 Web Based GIS System

7.4 System Analysis and Design with GIS

Laboratory Work: The lab should cover at least the concepts given in the chapters.

Reference Books:

Principles of Geographic Information Systems: An Introductory Text Book, International Institute for Geo-Information Science and Earth

Observation, The Netherlands – By Rolf De By, Rechar A. Knippers, Yuxian Sun

ESRI Guide to GIS Analysis Andy Mitchell, ESRI Press, Red Lands

GIS Cook BOOK