Course Title: Geographical Information System **Credit: 3**
Course No: CSIT.416.2 **Number of period per week: 3+3**
Nature of the Course: Theory + Lab **Total hours: 45+45**
Year: Fourth, Semester: Seventh
Level: B. Sc. CSIT

1. Course Introduction

This course is designed to develop acquaintance with fundamental concepts of geographical information system. The course starts with the basic concepts and also includes geographic information and spatial data types, data management, referencing and positioning, data entry and preparation, data analysis, visualization, and opens GIS.

2. Objectives

On completion of this course, students will be able to develop knowledge in GIS and different related concepts to develop and use GIS.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Know about history, definition, scope and different application areas of GIS • Understand about GISystems, GIScience and applications • Gain knowledge about spatial data and geoinformation • Know about models of GIS, Maps, GIS databases, Spatial databases and Spatial analysis	**Unit I: Introduction [4 Hrs.]** 1.1. History, Definition, Scope, and Applications 1.2. GISystems, GIScience, and GIS applications 1.3. Spatial Data and Geoinformation 1.4. Models and Modeling; Maps; Databases; Spatial Databases and Spatial Analysis
• Understand about models and real world representations • Know about geographic phenomena • Understand computer representations of GIS • Understand to organize and manage spatial data • Know about temporal dimension	**Unit II: Geographic Information and Spatial Data Types [6 Hrs.]** 2.1. Models and Representations of the Real World 2.2. Geographic Phenomena 2.3. Computer Representations of Geographic Information 2.4. Organizing and Managing Spatial Data 2.5. the Temporal Dimension
• Identify different hardware and software trends for GIS • Know about GIS for data management and processing data • Know different stages of spatial data	**Unit III: Data Management and Processing Systems [7 Hrs.]** 3.1. Hardware and Software Trends 3.2. Geographic Information Systems 3.3. Stages of Spatial Data Handling 3.4. Database Management Systems

handling • Understand about database management systems for GIS • Study about GIS and spatial data	3.5. GIS and Spatial Database
• Develop knowledge on spatial referencing • Develop knowledge on satellite based positioning	**Unit IV: Spatial Referencing and Positioning [6 Hrs.]** 4.1. Spatial Referencing 4.2. Satellite-based Positioning
• Know about spatial data input • Understand about data quality • Know about data preparation • Know about point data transformation	**Unit V: Data Entry and Preparation [6 Hrs.]** 5.1. Spatial Data Input 5.2. Data Quality 5.3. Data Preparation 5.4. Point Data Transformation
• Know about classification of analytical GIS capabilities • Understand about retrieval, classification and measurement in spatial data analysis • Know about overlay functions • Know about neighborhood functions	**Unit VI: Spatial Data Analysis [6 Hrs.]** 6.1. Classification of Analytical GIS Capabilities 6.2. Retrieval, Classification and Measurement 6.3. Overlay Functions 6.4. Neighborhood Functions
• Know to visualize GIS and maps • Know about the visualization process • Develop knowledge on visualization strategies	**Unit VII: Data Visualization [7 Hrs.]** 7.1. GIS and Maps 7.2. the Visualization Process 7.3. Visualization Strategies
• Know about open concepts in GIS • Know to use open source software for data analysis	**Unit VIII: Open GIS [3 Hrs.]** 8.1. Introduction of Open Concept in GIS 8.2. Open Source Software for Spatial Data Analysis

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weightage**	**Marks**	**Practical**	**Weightage**	**Mark**
End semester examination	60	Assignments	20%	20	Practical Report copy	25%	20
(Details are given in the separate table at the end)		Quizzes	10%		Viva	25%	
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	60	Total Internal	100%	20		100%	20
Full Marks 60+20+20 = 100							

External evaluation

1. **End semester examination:**
   It is a written examination at the end of the semester. The questions will be asked covering all the units of the course. The question model, full marks, time and others will be as per the following grid.

2. **External Practical Evaluation:**
   After completing the end semester theoretical examination, practical examination will be held. External examiner will conduct the practical examination according to the above mentioned evaluation. There will be an internal examiner to assist the external examiner. Three hours time will be given for the practical examination. In this examination Students must demonstrate the knowledge of the subject matter.

Full Marks: 100, Pass Marks: 45, Time: 3 Hrs

Nature of question	Total questions to be asked	Total questions to be answered	Total marks	Weightage
Group A: multiple choice*	20	20	20×1 = 20	60%
Group B: Short answer type questions	7	6	6×8 = 48	60%
Group C: Long answer type question/long menu driven programs	3	2	2×16 =32	60%
			100	100%

Each student must secure at least 50% marks in internal evaluation in order to appear in the end semester examination. Failed student will not be eligible to appear in the end semester examinations.

Internal evaluation

Assignment: Each student must submit the assignment individually. The stipulated time for submission of the assignment will be seriously taken.

Quizzes: Unannounced and announced quizzes/tests will be taken by the respective subject teachers. Such quizzes/tests will be conducted twice per semester. The students will be evaluated accordingly.

Attendance in class: Students should regularly attend and participate in class discussion. Eighty percent class attendance is mandatory for the students to enable them to appear in the end semester examination. Below 80% attendance in the class will signify NOT QUALIFIED (NQ) to attend the end semester examination.

Presentation: Students will be divided into groups and each group will be provided with a topic for presentation. It will be evaluated individually as well as group-wise. Individual students have to make presentations on the given topics.

Mid-term examination: It is a written examination and the questions will be asked covering all the topics in the session of the course.

Discussion and participation: Students will be evaluated on the basis of their active participation in the classroom discussions.

Instructional Techniques: All topics are discussed with emphasis on real-world application. List of instructional techniques is as follows:

- Lecture and Discussion
- Group work and Individual work
- Assignments
- Presentation by Students
- Quizzes
- Guest Lecture

Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during that period. If a student fails to attend a formal exam/quiz/test, there won't be any provision for re-exam.

Laboratory Work

Students should be able to use any GIS software to store, retrieve, manage, display, and analyze geographic and spatial data.

Prescribed Text:

1. Principles of Geographic Information Systems (GIS): an Introductory Textbook, O. Huisman, and R.A. De By, ITC Educational Textbook Series (2009)

References:

1. Principles of Geographical Information Systems, Third Edition, Peter A. Burrough, Rachael A. McDonnell, and Christopher D. Lloyd
2. An Introduction to Geographical Information Systems, Ian Heywood, Sarah Cornelius, and Steve Carver, Pearson