

**COURSE CODE:** GIE- 419  
**COURSE NAME:** SPATIAL DECISION SUPPORT SYSTEM  
**CREDIT HOURS:** Theory = 02  
 Practical = 01  
 Total = 03  
**CONTACT HOURS:** Theory = 32  
 Practical = 48  
 Total = 80  
**PREREQUISITE:** GIE-409 (Spatial Databases)

**MODE OF TEACHING:**

Instruction: Two hours of lecture per week 67%  
 Practical: Three hours of Lab work per week 33%

**COURSE DESCRIPTION:**

Decision analysis is a set of systematic procedures for analyzing complex decision problems. It has its importance in geographical information science. Many real-world spatial planning and management problems give rise to the use of spatial decision support systems where it often becomes difficult to choose the most appropriate decision in the presence of several alternatives.

**COURSE OBJECTIVES:**

This course is mainly designed to convey the basics of SDSS and its use in different application areas. This course provides an introduction to spatial decision support systems including multi-criteria decision analysis techniques. The course covers topics such as DSS, SDSS, Components of SDSS, SDSS Application and Challenges and Multi-criteria techniques.

**RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the PLOs:

- |   |                                  |                                     |    |   |                          |
|---|----------------------------------|-------------------------------------|----|---|--------------------------|
| 1 | Engineering Knowledge:           | <input type="checkbox"/>            | 7  | Ethics:                                 | <input type="checkbox"/> |
| 2 | Problem Analysis:                | <input type="checkbox"/>            | 8  | Individual and Collaborative Team Work: | <input type="checkbox"/> |
| 3 | Design/Development of Solutions: | <input checked="" type="checkbox"/> | 9  | Communication:                          | <input type="checkbox"/> |
| 4 | Investigation:                   | <input type="checkbox"/>            | 10 | Project Management:                     | <input type="checkbox"/> |
| 5 | Tool Usage:                      | <input type="checkbox"/>            | 11 | Lifelong Learning:                      | <input type="checkbox"/> |
| 6 | The Engineer and Society:        | <input checked="" type="checkbox"/> |    |   |                          |

**COURSE LEARNING OUTCOMES:**

Upon successful completion of the course, the student will demonstrate competency by being able to:

No.	CLO	Domain	Taxonomy Level	PLO
1	Demonstrate advanced level concepts of spatial decision support systems for improved decision making of societal problems.	Cognitive	3	6
2	Develop SDSS applications in Python Programming Language	Cognitive	4	3

**TOPICS COVERED:****Theory:**

Week	Topics
1	Introduction to Decision Support System (DSS)
2	The systems perspective of a DSS
3	SDSS Introduction
4	Evolution and Trends in SDSS
5-6	Components of SDSS I
7	Components of SDSS II
8	Building SDSS Software
9	Building Desktop and Web-based SDSS
10	SDSS Modelling
11-12	SDSS Applications
13	Multi-criteria Decision Analysis, Spatial multi criteria decision analysis, Evaluation Criteria, Hierarchical structure of evaluation criteria, Criterion maps, Scale of measurement, Deriving commensurate criteria maps, Linear scale transformation, Value utility function, Probabilities, and fuzzy sets
14	SDSS Applications, Decision alternative and constraints, Criterion Weighting, Ranking methods, Rating methods, pairwise comparison method, Trade-off analysis method, Decision Rules,
15	Multi attributes decision rules, Simple additive weighting methods, Analytical hierarchy process. Multi criteria decision support systems, Spatial data processing systems, Spatial expert systems
16	SDSS Challenges and Future Directions
17-18	<b>ESE</b>

**Practical:**

No.	Topics
1.	Case Study on Super Market- An example of Decision Support System
2.	Identification of Entities and Attributes for SDSS on Given Scenario's
3.	Exploration of existing SDSS in preparation for group term projects
4.	Hands on exercise on Python
5.	Hands-on exercise on River Width Calculator- An SDSS
6.	Hands-on exercise on Forest Change Detector- An SDSS
7.	Basics of Python (For ArcGIS 10)
8.	Basics of Python (For ArcGIS 10)
9.	Python for Everyone
10.	Python Toolbox and PyOT
11.	Accessing the Feature Classes in Python
12.	A practical example of Web SDSS

**Books:**

**Textbook:** 1. Spatial Decision Support Systems: Principles and Practices, RamanathanSugumaran, 2011. ISBN: 978-1-4200-6212-0

- Reference Books:**
- GIS and Multicriteria Decision Analysis, Jacek Malczewski, 1999, ISBN:0-471-32944-4
  - Decision Support Systems for Business Intelligence, 2nd Edition, Vicki L. Sauter, 2011, ISBN: 978-0-470-43374-4
  - Decision Support Systems in the 21st century, George M. Marakas, 2004, Prentice Hall, India.

## ASSESSMENT SYSTEM:

### 1. CLOs Assessment

<b>Cognitive</b>	<b>Psychomotor</b>	<b>Affective</b>
Spreadsheet	-	-

### 2. Relative Grading

<b>Theoretical / Instruction</b>			67%
	<i>Assignments 10%</i>		
	<i>Quizzes 10%</i>		
	<i>Mid Semester Exam 30%</i>		
	<i>End Semester Exam 50%</i>		
<b>Practical Work</b>			33%
<i>Laboratory Work</i>		70%	
	<i>Laboratory Assignment 70%</i>		
	<i>Semester Project 30%</i>		
<i>Viva/Quiz</i>		30%	
<b>Total</b>			<b>100%</b>