

Course Description**GIS2047 | Applications of GIS Technology | 4.00 credits**

This course teaches the principles of urban analytics and disaster management through what-if scenario modeling in which risks are evaluated and managed in order to support better decision making. By the end of the course, the student will apply a remote sensing technique to generate GIS data. Prerequisite: GIS 2045.

Course Competencies

Competency 1: The student will demonstrate an understanding of a sustainable city and an inclusive city by:

1. Identifying planning support tools for scenario analysis
2. Describing the process of building a framework to support sustainable development
3. Describing the relationship between outdoor walking levels and neighborhood-built environments
4. Defining the role of public spaces in promoting social interaction
5. Explaining spatial variability of urban quality of life

Competency 2: The student will demonstrate an understanding of urban analytics and GIS by:

1. Explaining urban sensing, data management, and urban analytic challenges
2. Describing geographic data sets
3. Comparing social network data sets
4. Interpreting public data sets
5. Defining urban sensing
6. Describing urban computing applications

Competency 3: The student will plan and conduct, or simulate missions involving the proper use of complex sensing systems on unmanned aircraft by:

1. Identifying the image acquisition plan type
2. Selecting the unmanned aircraft and sensor combination to utilize depending on the application
3. Calculating the flight height to meet the target Ground Sampling Distance (GSD)
4. Deciding the overlapping among images depending on the type of terrain to study
5. Designing the overlay of the Ground Control Points
6. Configuring the camera settings
7. Executing or simulating the mission

Competency 4: The student will demonstrate an understanding of how to process remote sensing data and visualize it by:

1. Georeferencing the images
2. Using a processing area to restrict the area of interest
3. Processing the Ground Control Points (GCP) GPS coordinates
4. Marking aerial targets on images
5. Performing the initial processing
6. Analyzing the accuracy of the model
7. Exporting geographic data for visualization and analysis such as point clouds and ortho mosaics
8. Listing lessons learned from the exercises

Competency 5: The student will demonstrate an understanding of the role of IT in disaster and emergency management by:

1. Analyzing frameworks for disaster management
2. Observing the role of spatial technology in risk and disaster management
3. Observing the spatiotemporal dimension of disaster management and emergency response
4. Diagramming attribute, node, area, and network- based analysis
5. Reviewing advances in internet-based GIS for disaster management

6. Observing disaster management decision making
7. Identifying stakeholders

Competency 6: The student will demonstrate an understanding of the basic concepts of disaster management and emergency response by:

1. Distinguishing principles and practices of disaster management
2. Examining disaster recovery and management structures
3. Differentiating between disaster and emergency
4. Studying mechanisms for regulating disaster and emergency
5. Studying global disaster initiatives

Competency 7: The student will demonstrate an understanding of WebGIS techniques and applications by:

1. Outlining GIS web services and client applications
2. Justifying GIS support for disaster management
3. Applying WebGIS in mitigation, preparedness, response, recovery
4. Developing flood risk assessments
5. Manipulating risk context, vulnerability, analysis, evaluation, and communication

Competency 8: The student will demonstrate an understanding of public participation in WebGIS by:

1. Appraising the role of communication media in disaster management
2. Summarizing the importance of public engagement
3. Identifying the tools for collaboration and participation
4. Proposing integration of internet-based GIS
5. Concluding the role of mobile GIS in emergency and disaster management
6. Researching mobile apps for disaster management on and offline
7. Summarizing social media uses for crowdsourcing information and recovery efforts
8. Writing situational awareness, local information, public safety, and crisis information

Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Use computer and emerging technologies effectively