

Asian Institute of Technology
School of Engineering and Technology

AT76.26 Geospatial Data Processing and Management 2(1-3) Semester: Intersem

Course Objective: The objective of this course aims to provide the fundamentals of spatial data processing and analysis, including data pre-processing, exploration of data input, visualization and manipulation, Software customization and development. It also addresses the basis of data processing using spatial databases both in database design, implementation and management.

Learning Outcomes :

The students on the completion of this course would be able to:

1. Use software to conduct basic data processing and analysis on geospatial data.
2. Publish and visualize output/result on geospatial data visualization tools.
3. Identify and communicate concept of big data and data processing for large-scale.
4. Apply data processing techniques to process and analysis spatial trajectory data.
5. Process and analyse data using database system.

Prerequisite: None

Course Outline:

- I. Introduction
 1. Overview and History of Data Processing
 2. Concept of Spatial Data Processing
 3. Geospatial data and trajectory data

- II. Data Pre-Processing
 1. Data Validation
 2. Data Filtering and Sorting
 3. Outlier Detection and Removal

- III. Data Processing System
 1. Concepts of Data Processing System
 2. File-based data processing
 3. Database Concept
 4. SQL Language
 5. Spatial Database
 6. PostGIS

School Recommendation: _____

ADRC Approval: 10 April, 2019

Academic Senate Approval: 24 April, 2019

IV. Data Visualization

1. Overview of Data Visualization
2. Software for Geospatial Data Visualization
3. Geospatial data on Map

V. Big Data Processing

1. Big Data
2. Concepts of Cloud Computing
3. Data Management for Big Data
4. Basic Data Processing on Cloud/Large-Scale Platform

Laboratory Session(s):

1. File-Based Processing.
2. Database.
3. Spatial Database: Basic Structure and function.
4. Spatial Database: Complex SQL and Spatial Query.
5. Data Analysis Tools: Basic Structure and function.
6. Data Analysis Tools: Clustering, Classification.
7. Data Analysis Tools: Complex Analysis.
8. Data Visualization Tools.
9. Trajectory Data Processing using GPS data.

Learning Resources:

Textbooks: No designated textbook, but class notes and handouts will be provided

Reference Books:

Zheng, Yu:

Computing with Spatial Trajectories, Springer, Verlag New York, 2011

Journals and Magazines:

1. International Journal of Geographical Information Science - Taylor & Francis
2. Computers, Environment and Urban Systems - Elsevier
3. Pervasive and Mobile Computing - Elsevier
4. Pervasive Computing - IEEE

Others: None

Teaching and Learning Methods:

School Recommendation: _____

ADRC Approval: 10 April, 2019

Academic Senate Approval: 24 April, 2019

1. **Lectures and class discussion:** Students will receive the lecture notes and weekly lecture schedule at the beginning of the course. They will be requested to read the lecture notes before coming to the class.
2. **Laboratory sessions:** The laboratory instruction will be provided to the students. Additionally, the software and example data will be provided so that student will perform in the same environment. Lab instruction will provide a basic guideline for student to learn and be familiar in each lab objective. Students are request to apply the knowledge of each lab and submit the home assignments.

Time Distribution and Study Load:

Lecture: 15 Hrs

Laboratory: 45 Hrs

Self-study + Assignments: 60 Hrs

Evaluation Scheme:

Laboratory report and exercise: 30%

Assignment: 30%

Final examination (open book, on computer): 40%

In the examination, an "A" would be awarded if a student can elaborate the knowledge learned in the class by giving his/her own skills for conducting geospatial data processing completely. A "B" would be awarded if a student shows an overall understanding of all give topics, a "C" would be given if a student meets below average expectation on both knowledge acquired and analysis. A "D" would be given if a student does not meet basis expectations in understanding and analyzing the topics and issues presented in course.

Instructor(s): Dr. Apichon Witayangkurn

School Recommendation: _____

ADRC Approval: 10 April, 2019

Academic Senate Approval: 24 April, 2019