Asian Institute of Technology
School of Engineering and Technology

AT76.23 ***Free and Open Source Software and for Geospatial Analysis*** **2(1-3)**
Semester: Intersem

Course Objective: The objective of this course aims at providing students with practical utilization of Free and Open Source Software (FOSS) for data manipulation, management and analysis of remote sensing images and GIS data. Students will be trained to able to use and integrate FOSS to make comprehensive system which provides powerful functionalities at very affordable cost.

Learning Outcomes:

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

1. Describe the new opportunities for indigenous Geoinformatics software industries using Free and Open Source Software
2. Conduct data manipulation and data management for pre-processing procedure
3. Perform geospatial analysis using Free and Open Source Software
4. Comprehend and integrate various Free and Open Source Software for geospatial analysis

Prerequisite: None

Course Outline:

I. Introduction
   1. Overview and history
   2. Concepts of Free and Open Source Software for Geospatial (FOSS4G)

II. Free and Open Source Software for Geospatial (FOSS4G)
   1. Categories and examples of FOSS4G
   2. The Open Source Geospatial Foundation (OSGeo)

III. GDAL/OGR) and MODIS Reprojection Tool for data manipulation
   1. Concept and functionalities
   2. MODIS reprojection tool
   3. GDAL for raster data
   4. OGR for vector data
   5. GDAL/OGR API (Application Programming Interface)

IV. PostGIS for Geospatial Database

1. Concept and functionalities
2. Geospatial database management and queries
3. Basic topology support, Data validation and coordinate transformation
4. Geometry processing

V. GRASS GIS-I

1. Concept and functionalities
2. GRASS GIS for raster data
3. GRASS GIS for vector data

VI. GRASS GIS-II

1. Spatial analysis with GRASS GIS
2. Integrated system of GDAL, PostGIS, QGIS, R and GRASS GIS

VII. Quantum GIS (QGIS) : the powerful desktop GIS software

1. Concept and functionalities
2. QGIS for raster data
3. QGIS for vector data
4. Spatial analysis with QGIS
5. QGIS Plug ins
6. Connecting OGC Web Services and PostGIS

Laboratory Session(s):

1. Introduction of OSGeoLive and basic linux command
2. MODIS reprojection Tool, GDAL/ OGR Library
3. Geospatial database management with PostgreSQL/Post GIS
4. Geospatial database analysis with PostgreSQL/Post GIS
5. Basic geospatial analysis with GRASS GIS I
6. Advance geospatial analysis with GRASS GIS II
7. Basic geospatial analysis with QGIS
8. Integrate system for geospatial analysis with QGIS

Learning Resources:

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

Reference Books:

K. Menker and GISP et al:

Mastering QGIS (2nd Edition), Packt Publication, USA, 2016

M. Neteler and H. Mitasova:

Open Source GIS: A GRASS Approach, Third Edition, Springer, USA, 2009

T. Mitchell:

Web Mapping Illustrated, O'Reilly, USA, 2005

R. Obe and L. Hsu:

PostGIS in Action (2nd Edition), Manning Publications, USA, 2015

A. Bruy and D. Svidzinska:

QGIS by Example, Packt Publications, USA, 2015

Journals and Magazines: None

Others: None

Teaching and Learning Methods:

1. **Lectures and class discussion**: Students will received the lecture notes and the weekly lecture schedule at the beginning of the course, and requested them 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 in the Virtual Machine so that student can perform in the same environment. Lab instruction will provide a basic guideline for student to learn and be familiar with each lab objective. Students are requested 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: 45 Hrs.

Evaluation Scheme:

Laboratory report: 30%
Take home exam (open book and hands-on): 30%
Final exam (open book and hands-on): 40%

In the examination, an "A" would be awarded if a student can elaborate the knowledge and technique learned in the class by giving his/her own skills to integrate various Free and Open Source Software for geospatial analysis. 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 adaptation skills. A "D" would be given if a student does not meet basis expectations in understanding the topics and issues presented in course.

Instructor(s): Dr. Sarawut Ninsawat