Asian Institute of Technology
School of Engineering and Technology

AT76.18 ***Advance Mapping Techniques*** **2(2-0)** **Semester: January**

Course Objective: The objective of this course aims at providing knowledge and understandings of the RS/GIS and Computer Mapping Technology (CMT). It also provides more in-depth knowledge and skills for applications of the technologies and relevant service innovations.

Learning Outcomes:

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

1. Explain and communicate fundamentals concepts of cartography, map generalization and map design.
2. Identify and distinguish new mapping technologies such as GNSS, INS, laser range scanning, global earth observation, mobile mapping, UAV, web mapping.
3. Formulate scientific questions about geographical big data analysis.

Pre-requisite: None

Course Outline:

I. Introduction
   1. Overview and History for Mapping
   2. Concepts of Cartography
   3. Automated Mapping
   4. Mobile Mapping

II. Map Design and Visualization
   1. 2D/3D Symbol Design
   2. VR, 3D Map Output, and Web Mapping
   3. Applications and Case Studies

III. Mobile Mapping
   1. Concept of Mobile Mapping
   2. UAV Based Mapping
   3. Vehicle Base Mapping
   4. 3D Map Output
   5. Applications and Case Studies

IV. Laser Range Scanning
   1. Principles of Laser Range Scanning
   2. Airborne and Mobile/ Ground based Laser Range Scanner

3. Range Image Generation and Processing
4. Applications and Case Studies

V. Global Earth Observation
1. Introduction to Global Earth Observation
2. Spatial Data Infrastructure
3. Techniques for Global Earth Data
4. Applications and Case Studies

VI. Big Data Analysis
1. Principles of Big Data Analysis
2. Taxi Probe data and CDR (Call Detail Record)
3. Applications and Case Studies

VII. GNSS and INS for Real Time Positioning
1. WGS 84 Coordinate System
2. Real Time Positioning
3. Real Time Measurement by INS
4. Hardware and Software

Learning Resources: Lecture Notes

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

References:

Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind:
Geographic Information Science and Systems, Wiley, NJ, 2016.

Wenzhong Shi, Michael Goodchild, Brian Lees, Yee Leung:
Advances in Geo-Spatial Information Science, CRC Press, FL, 2012.

Journals and Magazines:

International Journal of Geographical Information Science, Taylor and Francis
Photogrammetric Engineering and Remote Sensing, American Society for Photogrammetry and Remote Sensing
ISPRS Journal of Photogrammetry and Remote Sensing, Elsevier
IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, IEEE
IEEE Geoscience and Remote Sensing Letters, IEEE
Coordinates, Coordinates Media Pvt Ltd
GIM International, Geomares Publishing
IEEE Spectrum, IEEE

Teaching and Learning Methods:

Teaching and learning methods include lectures, class discussions, demonstrations, and videos on the latest mapping technologies and applications to understand recent trends. The classes focus more on applications and benefits rather than technology basics.

Time Distribution and Study Load:

Lecture: 30 Hrs
Self-study: 90 Hrs

Evaluation Scheme:

Mid-semester examination: 30%
Assignment: 20%
Final-semester examination (close book): 50%

An "A" would be awarded if a student can demonstrate the knowledge and technique learned in the class by explaining various advanced mapping techniques through assignments and examinations. 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: Dr. Hiroyuki Miyazaki