Asian Institute of Technology
School of Engineering and Technology

AT76.15 ***Microwave Remote Sensing*** **2 (2-0)** **Semester: January**

Course Objective: This course is designed to provide fundamental knowledge and theories of microwave remote sensing. The fundamentals of electromagnetics, both real aperture and synthetic aperture radar systems will be introduced including physical principles.

Learning Outcomes :

The Students upon successful completion would be able to:

1. Identify the fundamental of interactive of electromagnetic radiation with matter
2. Compare difference type of microwave remote sensing (real aperture and synthetic aperture radar system) and apply the principle of remote sensing measuring the essence of phenomena
3. Apply principle of digital image processing for enhancing and analysis the microwave remote sensing
4. Conduct scientific microwave remote sensing research

Prerequisite: None

Course Outline:

I Introduction & Preparation
   1. Introduction
   2. Vector Analysis
   3. Electromagnetics

II Interaction of electromagnetic radiation with matter
   1. Maxwell's equations
   2. Dielectric constant
   3. Radar equation and Back scattering
   4. Polarization

III Synthetic Aperture Radar (SAR)
   1. SAR image and geometry
   2. Range/Azimuth resolutions
   3. Comparison with optical image

IV Some applications
   1. Interferometry.
   2. Flood mapping.

3. Soil moisture mapping.

Laboratory Session(s): None

Learning Resources:

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

Reference Books:

Alessandro Ferretti
Satellite InSAR data: reservoir monitoring from space. EAGE Publications bv, 2014.

C. Elachi, J. van Zyl:
Introduction to the Physics and Techniques of Remote Sensing (2nd Ed.), Hoboken, Wiley-Interscience, 2006.

J.C.Curlander, R.N.McDonough:
Synthetic Aperture Rader: Systems and Signal Processing, Wiley Series in Remote Sensing and Image Processing, 1991.

Journals and Magazines:

IEEE Transaction on Geoscience and Remote Sensing
International Journal of Remote Sensing
Journal of Geophysical Research

Others: None

Teaching and Learning Methods:

1. Lectures and class discussion: Students will receive the lecture notes and lecture schedule at the beginning of the course, and requested them to read the lecture notes before coming to the class.

Time Distribution and Study Load:

Lecture: 30 Hrs
Assignment: 10 Hrs
Other self-studies: 90 Hrs

Evaluation Scheme:

The final grade will be based on the following weight distribution: mid semester exam (40), final exam (40%), assignments (20%). An "A" would be awarded if a student can elaborate the knowledge learned in class by giving his/her own analysis on real case examples given in this course and from journal articles and including assigned readings. A "B" would be awarded if a student shows an overall understanding of all given 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 the course.

Instructor(s): Adjunct/Affiliated/Seconded Faculty