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:*  

*J.C.Curlander, R.N.McDonough:*  

**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 base expectations in understanding and analyzing the topics and issues presented in the course.

**Instructor(s):** Adjunct/Affiliated/Seconded Faculty