Course Type	Course Code	Name of the Course	L	T	P	Credits
DP	NMNC528	Microwave Remote Sensing Lab	0	0	3	1.5

Course Objective

Course is designed to impart the practical knowledge on microwave remote sensing. This course is also designed to supplement the theory course namely Microwave Remote Sensing (NMNC526) practically. This course is also designed in view of the demands of the microwave remote sensing. It is also designed considering the diversified background of the students from different engineering and science disciplines.

Learning Outcomes

The students will be able to learn the SAR Raw data processing, visual image analysis of SAR data, pre-processing of SAR data, Polarimetric processing of SAR data, SAR image co-registration, CC product generation, 3D phase unwrapping, InSAR processing for DEM generation, DInSAR processing for deformation product generation, MTInSAR processing for slow and fast deformation time-series product generation

Units	Course Content	L+T	Learning Outcomes
Unit 1	SAR Raw data (L0) processing to L1 product	3	Students will learn the steps involved in generating L1 (SLC/mli) SAR product from Raw SAR data (L0).
Unit 2	Visual Analysis and interpretation of microwave SAR image	3	Students will learn how visual image analysis is done over the multi-look intensity (mli) SAR image and will also prepare a classified map.
Unit 3	Pre-processing of SAR images including multilooking, speckle filtering, geocoding and terrain correction	3	Students will learn the steps involved in multi-looking, speckle filtering, geocoding and terrain correction processing of SAR image
Unit 4	Advance digital processing of SAR images including polarimetry, speckle and texture filter	3	Students will learn the steps involved in polarimetry, speckle and texture filter processing of SAR image
Unit 5	SAR Image Co-registration	3	Students will learn the steps involved in co-registration process of two SLC SAR images.
Unit 6	Correlation co-efficient (coherence) map generation of InSAR images	3	Students will learn the steps involved in coherence product generation from two SLC SAR images, and will also analyses and prepare a coherence map of the product
Unit 7	3D (2D+1D) Phase unwrapping of complex SAR interferograms	3	Students will learn the steps involved in 2D and 1D phase unwrapping in interferometric processing.
Unit 8	InSAR processing for Digital Elevation Model (DEM) generation	3	Students will learn the steps involved in across track (single pass) interferometry to generate a DEM
Unit 9	DInSAR processing for mining induced subsidence modelling	3	Students will learn the steps involved in DInSAR processing to generate a mining induced subsidence map
Unit 10	DInSAR processing for earthquake modelling	3	Students will learn the steps involved in DInSAR processing to generate an earthquake induced displacement map
Unit 11	Single reference MTInSAR processing for mining	3	Students will learn the steps involved in single reference MTInSAR processing to generate a

	induced subsidence modelling		slow deformation time-series product and map
Unit 12	Multi-reference MTInSAR processing for mining induced subsidence modelling	3	Students will learn the steps involved in single reference MTInSAR processing to generate a fast deformation time-series product and map
Unit 13	Project work	6	
	Total	**42**	

Textbook

1) Woodhouse, I.H., (2009): Introduction to Microwave Remote Sensing. CRC Press, Taylor & Francis.
2) Oliver, C and Quegan, S (2004): Understanding Synthetic Aperture Radar Images. Scitech publishing, Inc. Raleigh, NC-27613

Reference

1) Laboratory Manual