1.	Title of the course	Synthetic Aperture Radar and Applications
2.	Course number	CE541M
3.	Status of the course	Elective
4.	Structure of credits	2-0-2-3
5.	Offered to	PG
6.	New course/modification to	New
7.	To be offered by	Department of Civil and Environmental Engineering
8.	To take effect from	January 2023
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	**Course Objective(s):** To illustrate the use of Synthetic Aperture Radar (SAR), a widely used microwave remote sensing technology, for Earth observation. To provide practical experience for using this technology in various applications related to geodesy, agriculture, disaster management etc.	
12.	**Course Content:** Synthetic Aperture Radar (SAR): SAR image formation, resolution and look, geometric effects, imaging modes, satellite missions; SAR Interferometry (InSAR): principle of InSAR, InSAR for Digital Elevation Model (DEM) generation, differential SAR interferometry for deformation monitoring, Multi-Temporal SAR Interferometry (MT-InSAR), persistent scatterers, Persistent Scatterer SAR Interferometry (PS-InSAR), distributed scatterers, Small Baseline Subset (SBAS), SqueeSAR; SAR Polarimetry (PolSAR): polarization representation, polarimetric basis, measurement of the backscattering matrix, scattering target vectors, covariance and coherency matrix, speckle filtering, scattering mechanisms of various target, concept of target decomposition, polarimetric SAR image classification; Polarimetric SAR Interferometry (PolInSAR).	
13.	**Textbook(s):** 1. Hajnsek I and Desnos Y L, *Polarimetric Synthetic Aperture Radar: Principles and Application*, 1st Edition, Springer Nature (2021). 2. Hanssen R F, *Radar Interferometry: Data Interpretation and Error Analysis*, 1st Edition, Springer Science and Business Media (2001).	
14.	**Reference(s):** 1. Ferretty A and Guarnieri A P, *InSAR Principles: Guidelines for SAR Interferometry Processing and Interpretation*, 1st Edition, European Space Agency Publication (2008). 2. Lee J S and Pottier E, *Polarimetric Radar Imaging: From Basics to Applications*, 1st Edition, CRC Press (2009).	