

Description of “SAR imaging”

Information			
Administering Department		College	
Module Leader		e-mail	
Module Leader's Acad. Title			
Scientific Committee Approval Date		Version Number	1.0

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Understanding SAR Principles: Introducing students to the fundamental principles of SAR imaging, including how radar systems work, signal processing techniques, and the physics behind SAR technology. 2. Image Formation: Teaching students how SAR images are formed, focusing on concepts such as range resolution, azimuth resolution, and image interpretation. 3. Data Processing Techniques: Educating students on SAR data processing methods, including image filtering, speckle reduction, image enhancement, and multi-temporal analysis. 4. Interpretation Skills: Developing students' ability to interpret SAR imagery, understand the characteristics of different land cover types, identify objects of interest, and extract meaningful information from SAR data. 5. Applications of SAR: Exploring a range of applications for SAR imaging, such as land cover classification, monitoring of natural disasters, agriculture, forestry, urban planning, and environmental studies. 6. Hands-On Experience: Providing students with practical experience in working with SAR data, processing software, and tools to manipulate and analyze SAR images. 7. Remote Sensing Concepts: Integrating SAR imaging within the broader context of remote sensing, emphasizing its strengths, limitations, and complementary nature with other remote sensing technologies.

	8. Research Skills: Encouraging students to conduct research projects using SAR data, develop algorithms for SAR image processing, and explore innovative applications of SAR technology. 9. Critical Thinking: Stimulating critical thinking skills by challenging students to analyze complex SAR datasets, evaluate the quality of SAR images, and propose solutions to real-world problems using SAR technology. 10. Professional Development: Providing students with knowledge and skills that are relevant to careers in remote sensing, geospatial analysis, environmental monitoring, and related fields, preparing them for future employment opportunities in the industry or academia.
Module Learning Outcomes	1. Understanding SAR Principles: - Explain the fundamental principles of SAR imaging, including radar signal transmission, reception, and processing techniques. 2. Image Formation and Interpretation: - Describe how SAR images are formed and interpret the characteristics of SAR imagery in terms of resolution, speckle noise, and image features. 3. SAR Data Processing: - Demonstrate proficiency in SAR data processing techniques, including image filtering, speckle reduction, and image enhancement methods. 4. Applications of SAR Technology: - Identify and discuss a range of applications for SAR imaging, such as land cover classification, terrain mapping, disaster monitoring, agriculture, and forestry management. 5. Remote Sensing Integration: - Integrate SAR imaging within the broader context of remote sensing, understanding its advantages, limitations, and complementary nature with other remote sensing technologies. 6. Hands-On Experience with SAR Data: - Apply practical skills in working with SAR data, utilizing software tools for SAR image processing, interpretation, and analysis. 7. Problem-Solving Skills: - Develop the ability to analyze complex SAR datasets, solve problems related to SAR image interpretation, and propose solutions for real-world applications using SAR technology. 8. Research and Development: - Conduct research projects using SAR data, develop algorithms for SAR image

	processing, and explore innovative applications of SAR technology in various fields. 9. Critical Thinking and Evaluation: - Critically evaluate the quality of SAR images, assess the accuracy of SAR data analysis, and make informed decisions based on SAR-derived information. 10. Professional Development and Communication: - Demonstrate effective communication skills in presenting SAR imaging concepts, research findings, and applications to both technical and non-technical audiences.
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SAR imaging Syllabus	
Week 1	SAR system components and operation
Week 2	SAR Image Formation
Week 3	SAR image geometry and parameters
Week 4	SAR data pre-processing techniques
Week 5	Image filtering and speckle reduction
Week 6	SAR image enhancement methods
Week 7	Land cover classification using SAR data
Week 8	Monitoring of natural disasters and environmental changes
Week 9	SAR applications in agriculture, forestry, and urban planning
Week 10	Interferometric SAR (InSAR) for terrain mapping
Week 11	Polarimetric SAR (PolSAR) for target characterization
Week 12	Change detection using SAR imagery
Week 13	Case studies demonstrating the use of SAR technology in different scenarios
Week 14	Group projects on SAR data analysis and interpretation
Week 15	Final assessment

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts		

Recommended Texts		
Websites		