Description of “Remote Sensing in Structure Geology”

Information				
Administering Department		**Remote Sensing**	**College**	**Remote Sensing & Geophysics College**
Module Leader	**Ahmed abbas Hasan**		**e-mail**	Ahmad.a.h@kus.edu.iq
Module Leader’s Acad. Title		**Assistant Professor**		
Scientific Committee Approval Date			**Version Number**	1.0

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	1. Understanding Geological Structures: - Develop an understanding of geological structures such as folds, faults, joints, and fractures, and how they can be detected and analyzed using remote sensing data. 2. Interpretation of Remote Sensing Data: - Gain proficiency in interpreting remote sensing imagery, including satellite imagery, aerial photographs, LiDAR data, and digital elevation models, to identify and characterize geological structures. 3. Integration of Remote Sensing with Structural Geology: - Explore the integration of remote sensing data with traditional field mapping techniques in structural geology to enhance structural analysis and mapping accuracy. 4. Detection of Lineaments and Structural Features: - Learn methods for detecting lineaments, fault traces, and other structural features using remote sensing data, and understand their significance in geological mapping and exploration. 5. Quantitative Analysis of Geological Structures: - Apply quantitative methods and image processing techniques to analyze the orientation, spatial distribution, and geometry of geological structures observed in remote sensing data. 6. Mapping Geological Structures:

	- Develop skills in mapping geological structures using remote sensing tools and software, and create accurate structural maps for geological interpretation and resource exploration. 7. Geological Hazard Assessment: - Explore the use of remote sensing for assessing geological hazards such as landslides, rockfalls, and seismic activity, and understand how structural geology plays a role in hazard identification and mitigation. 8. Remote Sensing Applications in Structural Geology: - Investigate a range of applications of remote sensing in structural geology, including tectonic studies, mineral exploration, groundwater mapping, and environmental monitoring. 9. Field Validation and Ground Truthing: - Understand the importance of field validation and ground truthing in remote sensing studies of geological structures, and learn how to integrate field data with remote sensing observations. 10. Research and Innovation: - Encourage students to explore research opportunities in the field of remote sensing in structural geology, develop innovative methodologies, and contribute to advancements in geological mapping and analysis.
Module Learning Outcomes	1. Geological Structure Interpretation: - Demonstrate the ability to interpret remote sensing data to identify and analyze geological structures such as folds, faults, joints, and fractures. 2. Remote Sensing Techniques: - Apply remote sensing techniques, including satellite imagery analysis, LiDAR data processing, and digital image interpretation, to characterize geological structures. 3. Integration of Field and Remote Sensing Data: - Integrate remote sensing data with field observations to enhance structural analysis, mapping accuracy, and geological interpretation. 4. Lineament Detection and Analysis: - Utilize remote sensing tools to detect and analyze lineaments and other structural features, understanding their significance in geological mapping and exploration. 5. Quantitative Structural Analysis: - Apply quantitative methods and image processing techniques to analyze the orientation, distribution, and geometry of geological structures observed in remote sensing data.

	6. Structural Mapping Skills: - Demonstrate proficiency in mapping geological structures using remote sensing software and tools, producing accurate structural maps for geological interpretation. 7. Geological Hazard Assessment: - Evaluate geological hazards using remote sensing data and structural geology principles, identifying potential risks and contributing to hazard assessment and mitigation strategies. 8. Applications of Remote Sensing in Structural Geology: - Explore and discuss various applications of remote sensing in structural geology, including tectonic studies, mineral exploration, groundwater mapping, and environmental monitoring. 9. Field Validation and Ground Truthing: - Understand the importance of field validation and ground truthing in remote sensing studies of geological structures, and effectively integrate field data with remote sensing observations. 10. Research and Communication Skills: - Conduct independent research projects applying remote sensing techniques to structural geology problems, and effectively communicate findings through reports and presentations.

Remote sensing in Structure Geology Syllabus	
Week 1	**Geological structures: folds, faults, joints, fractures**
Week 2	**Interpreting geological structures using remote sensing imagery**
Week 3	**Satellite imagery analysis for structural mapping**
Week 4	**Digital image processing techniques for structural feature detection**
Week 5	**Integration of Field and Remote Sensing Data**
Week 6	**Field validation and ground truthing in remote sensing studies**
Week 7	**Integrating field observations with remote sensing data for structural analysis**
Week 8	**Lineament Detection and Analysis**
Week 9	**Methods for detecting and analyzing lineaments using remote sensing data**
Week 10	**Importance of lineaments in structural geology and resource exploration**
Week 11	**Quantitative methods for analyzing the orientation and geometry of geological structures**

Week 12	**Image processing techniques for structural feature extraction**
Week 13	**Using remote sensing for geological hazard assessment**
Week 14	**Project Presentations**
Week 15	**Pre-final exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts		
Recommended Texts		
Websites		