

**33. Remote Sensing (PH036IU)**

Module designation	<i>In this course, students will be able to extract physical information of the Earth's surface using remote sensing, applying for forestry, agriculture, water resources, and environment. Wavelength ranges used in this course are ultraviolet, visible, short-wavelength infrared, thermal infrared, and microwave.</i>
Semester(s) in which the module is taught	1, 2
Person responsible for the module	Dr. Phan Hiền Vũ
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 127.5 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 37.5 Private study including examination preparation, specified in hours: 90
Credit points/ECTS	3 credits/4.62 ECTS
Required and recommended prerequisites for joining the module	Previous course: General Physics 3 (PH023IU) Parallel Course: General Physics 3 Laboratory (PH024IU)



Module objectives/intended learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Explain geophysical measurements derived from remotely sensed data with a wide range from visible to microwave wavelengths CLO2. Develop applications in forest, agriculture, water resources and environment using remote sensing data
	Skill	CLO3. Classify land surface from optical and thermal remote sensing images
	Attitude	CLO4. Show the impact of remote sensing techniques for natural resource and environmental management, and sustainable development.



Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>		
	Topic	Weight	Level
	Chapter 1: Introduction to Concepts and Systems	2	T
	Chapter 2: Photographs and Digital Images from Aircraft and Satellites	3	T
	Chapter 3: Earth Resource and Environmental Satellites	3	T
	Chapter 4: Thermal Infrared Images	2	T
	Chapter 5: Radar Technology and Terrain Interactions	2	T
	Chapter 6: Forest, agricultural, water resources and environmental applications	3	T
Examination forms	Exam		
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>		



Reading list	<p>Textbooks:</p> <p>[1] F. F. Sabins, <i>Remote sensing: Principles and Interpretation</i>, Waveland Press, Inc. (2007).</p> <p>References:</p> <p>[2] W.G. Rees, <i>Physical principles of remote sensing</i>, Cambridge University Press (2012).</p> <p>[3] Q. Weng, <i>Advances in environmental remote sensing: sensors, algorithms, and applications</i>, CRC Press (2011).</p>
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