



Syllabus «REMOTE SENSING FOR LAND RESOURCES MONITORING»

Educational-qualification level - Bachelor
Specialty 193. Geodesy and Land Management
Educational program «Geodesy and Land management»
Year of study 4, **semester** 8
Mode of study: full
ECTS hours – 3,0
Language: English

Instructor

Contacts

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eLearn webpage

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Course Overview:

The course "Remote sensing for Land Resources Monitoring» introduces students how remote sensing can benefit the observation land resources as a tool for acquiring information about the Earth through recording reflected or emitted energy. There are a large number of satellite sensors that vary in temporal, spatial coverage and resolution. Their characteristics and applications for land resources monitoring is observed in the course.

Students will learn the principles of remote sensing, and how relevant information can be derived from remote sensing data over a wide range of spatial and temporal scales and resolutions of sensors. Students will obtain image processing skills and learn how remote sensing data can be used to monitor land resources. The latest state-of-art techniques to analyse and interpret images will be used to understand local and regional changes in land resources.

Course aims: to learn the concepts of remote sensing and to get practical skills of image pre-processing and thematic geoprocessing to be used for monitoring of land resources.

Tasks of the course: to learn theoretical concepts of remote sensing and receiving remote sensing data; to learn general characteristics of optical sensors; to get skills of using methods of digital image processing.

The discipline provides the formation of a number of competencies:

- **general competencies:**

GC06 - Ability to use information and communication technologies.

- **special competencies:**

SC03. Ability to apply regulations, regulatory and technical documents, reference materials in professional activities.

SC04. Ability to select and use effective methods, technologies and equipment for professional activities in the field of geodesy and land management.

SC05. Ability to use modern information, technical and technological support to solve complex issues of geodesy and land management.

SC07. Ability to collect, update, process, critically evaluate, interpret, store, publish and use geospatial data and metadata on objects of natural and man-made origin.

- **learning results:**

LR4. To know and apply normative-legal acts, normative-technical documents, reference materials in the field of geodesy and land management and related branches in professional activity

LR5. To apply conceptual knowledge of natural and socio-economic sciences in performing tasks of geodesy and land management.

LR9. To collect, evaluate, interpret and use geospatial data, metadata on objects of natural and man-made origin, apply statistical methods of their analysis to solve specialized problems in the field of geodesy and land management.

LR14. To plan complex professional activities, develop and implement projects in the field of geodesy and land management under resource and other constraints.

The course Program and Structure

Topic	Hrs (lectures /laboratory/ individual)	Education result	Tasks	Grade
6 semestr				
SEMANTIC MODULE I. MODULE 1. CONCEPT OF REMOTE SENSING				
Theme 1. Concepts of remote sensing of the Earth. Electromagnetic radiation	2/8/7	To know the classification of methods of remote sensing, atmospheric radiative window and the spectral ranges (bands) used in RS; To understand differences between the reflectance and coefficient of reflectance	Submitting Laboratory works in eLearn; Submitting Individual work in eLearn	10
Theme 2. Visual interpretation of objects.	2/4/0	To know the direct elements of image interpretation and direct recognition, geometric, brightness's, structural elements of visual image interpretation; To distinguish structural, geometric and spectral characteristics of objects	Submitting Laboratory works in eLearn;	30
Theme 3. Classification of methods of remote sensing. Sensor systems.	2/0/10	To know classification of remote sensing methods; To be acquainted with low- medium-, high-spatial resolution sensor systems and their use for solving problems of land monitoring	Submitting Individual work in eLearn	10
Theme 4. Image acquisition. Data formats. Standards in remote sensing	2/3/5	To know main formats of deliverable remote sensing data and data processing levels; To analyze the possibilities of using	Submitting Laboratory work in eLearn; Submitting Individual work in eLearn	20

		high spatial resolution sensors and data obtained from UAVs		
Module control			Test	30
Total module 1	8/15/22			100
SEMANTIC MODULE 2. DIGITAL IMAGE ANALYSIS.				
Theme 1. Preprocessing of remotely sensed data	2/3/0	To know the main groups of operations for digital image processing: image restoration (correction), radiometric correction of digital image (radiance, radiometric correction of the atmosphere, image resampling and geometric correction); To distinguish the peculiarities of the use of methods for image atmospheric correction	Submitting Laboratory work in eLearn; Submitting Individual work in eLearn	15
Theme 2. Image georeferencing and image transformation	1/2/9	To know the basis of image geometric transformation; To be able to choosing control points; To use different methods of image transformation	Submitting Laboratory work in eLearn; Submitting Individual work in eLearn	10
Theme 3. Image acquisition based on Unmanned Aerial Vehicles (UAVs).	2/2/0	To know the basics of the UAV application in mapping to obtain a geodetic basis for cadastral activities, to ken the main characteristics of multispectral cameras and cameras in the visible range; To be able to use data from multispectral cameras to solve problems of land monitoring	Submitting Individual work in eLearn	15
Theme 4. Image classification.	2/8/14	To know the basis of image classification methods in remote sensing: unsupervised classification method (K-Means Classification, Isodata	Submitting Laboratory works in eLearn; Submitting Individual works in eLearn	30

		Classification), supervised classification methods (Parallelepiped Classification, Maximum Likelihood Classification, Minimum Distance Classification, Mahalanobis Distance Classification); To apply methods of supervised and unsupervised classification in thematic mapping of land resources		
Module control			Test	30
Total module 2	13/15/23			100
Total 6 semester				70
Final test			Final test	30
Total course				100

THE COURSE POLICY

<i>Deadline and rearrangement policy:</i>	Deadlines are defined in e-learn course. Works being submitted after deadlines without a reason are evaluated at a lower grade. Rearrangement of module tests takes place with the permission of the lecturer in case of a specific reasons (for example, illness).
<i>Policy of Academic Plagiarism:</i>	Copying other materials during individual works, tests and final test (including the use of mobile devices) are forbidden. Abstracts must have correct text references to the literature used.
<i>Policy of Attendance:</i>	Attendance of lessons is mandatory. According to objective reasons (for instance, illness, international internship) training can take place individually (in distance form (on-line) by agreement with the dean of the faculty)

STUDENT'S RATING SCALE

Student's rating points	The Ukrainian National Grades	
	exams	final tests
90-100	"Excellent"	passed
74-89	"Good"	
60-73	"Satisfactory"	
0-59	"Unsatisfactory"	fail