

COURSE DESCRIPTION

Course code	Volume in ECTS credits	Institution	Faculty	Department
MIS8027	7	VMU	Forest sciences and ecology	Institute of forest management and wood science

Course title in Lithuanian

Nuotoliniai metodai

Course title in English

Remote sensing

Study methods	Volume in ECTS credits
Lectures	2
Consultations	1
Practicums	1
Individual work	3

Short course annotation in Lithuanian (up to 500 characters)

Šiame kurse nagrinėjami nuotolinių tyrimų – vienos iš geomatikos disciplinų – teoriniai bei taikymų miškotyroje ir aplinkos tyrimuose praktiniai pagrindai. Nagrinėjamos šiuolaikinės nuotolinių tyrimų sistemos, jų veikimo principai, nuotolinių tyrimų duomenų rinkimo būdai, jų apdorojimo metodiniai sprendimai ir gautos informacijos integravimas į GIS. Taip pat nagrinėjami specifiniai nuotolinių tyrimų duomenų rinkimo bei apdorojimo sprendimai, susiję su doktoranto moksliniais interesais.

Short course annotation in English (up to 500 characters)

This course deal with fundamentals and application of remote sensing, considering the subject as one of key disciplines in geomatics, with specific focus on forestry and environmental applications. Modern remote sensing systems are introduced, discussing the principles they are based on, followed by the the principles of remotely sensed data collection, methodological solutions of extracting information from the data and its integration into geographic information systems. Depending on specific research interests of PhD students, specific data collection and processing solutions are analysed.

Relevance of the course

Remote sensing is one of the key techniques for collecting geographic data. Numerous monitoring systems in forestry and environmental research are built on use of remote sensing. This course is assumed for PhD students with research interests requiring more deep knowledge and skills in collecting and processing geographic data.

Course aims

To improve the understanding of fundamental concepts and operational solutions of remote sensing, as of one of disciplines in geomatics, to be able to use such techniques for forestry and environmental research.

Content (topics) and methods

Lectures:

Lecture 1. Remote sensing as one of disciplines of geoinformation science. Fundamentals of remote sensing.

Lecture 2. Remote sensing systems based on aerial photography. Digital aerial imaging, parameters of platforms and sensors.

Lecture 3. Photogrammetry. Characteristics of aerial images, parallaxes, why one needs for orthophotos, production of orthophotos.

Lecture 4. Visual interpretation of remotely sensed images. Stereo-photogrammetric measurements on aerial images.

Lecture 5. Multi-spectral, hyper-spectral and thermal sensors.

Lecture 6. Space-borne remote sensing platforms. Acquisition of satellite image.
 Lecture 7. Principles of processing of digital images.
 Lecture 8. Peculiarities of processing digital multi-spectral remotely sensed images in forestry (or other fields of application, depending on research interests of PhD student).
 Lecture 9. Peculiarities of processing digital hyper-spectral remotely sensed images in forestry (or other fields of application, depending on research interests of PhD student).
 Lecture 10. Laser scanning. Peculiarities of processing digital laser scanning data in forestry (or other fields of application, depending on research interests of PhD student).
 Lecture 11. Integration of remote sensing and geographic information systems.
 Lecture 12. Planning project based on remote sensing: data acquisition and processing planning, monitoring remote sensing project, sources of remote sensing data.
 Lecture 13. Examples of remote sensing application in Lithuanian (global) forestry (or other fields of application, depending on research interests of PhD student).
 Lecture 14. Future perspectives of remote sensing in the fields, relevant for PhD student.

Practicums:

Acquisition of remotely sensed data (mission planning for imaging, data search on geographic data warehouses or special data ordering systems).
 Pre-processing of remotely sensed data 1 (orthophoto production).
 Pre-processing of remotely sensed data 2 (radiometric and geometric corrections, enhancement and transformations).
 Processing of remotely sensed data using numerical approaches (depending on specific needs of PhD student, the focus may be on visual or computer interpretation of aerial images, processing multi- or hyper-spectral images, processing of laser point clouds, etc.).
 Integration of achieved information into further research.

Individual assignment

Individual assignment is given depending on specific needs of PhD student. Individual assignment could be combined with the practicums.

Structure of cumulative score and value of its constituent parts

Practicums – 20%, individual assignment - 20%; final exam - 60 %

Compulsory reference materials

No.	Authors of publication, title, publishing house, year of publication.
1.	Lillesand T.M., Kiefer R.W., Chipman J.W., 2015, Remote Sensing and Image Interpretation, Seventh Edition, John Wiley & Sons, Inc., 756 p.
2.	Mozgeris G., Dumbrasukas A., Jonikavičius D., 2014, Geoinformacinių sistemų pagrindai. Mokomoji knyga, Aleksandro Stulginskio universitetas.
3.	Mozgeris, G., 2010, Nuotoliniai metodai. Laboratorinių darbų aprašas, Lietuvos žemės ūkio universitetas, Aplinkos institutas, Miškų ir ekologijos fakultetas.

Supplementary reference materials

No.	Authors of publication, title, publishing house, year of publication.
1.	Daniulis J. Aerofotometodai: aerofotonuotraukų dešifravimas. Vadovėlis aukštųjų mokyklų studentams.- Vilnius: Enciklopedija, 1998. - 248 p.
2.	Сухих В.И., 2005, Аэрокосмические методы в лесном хозяйстве и ландшафтном строительстве. Учебник, 390 с.
3.	Činga G., Deltuvas R., Kuliešis A., Mankus R., Mažeika J.A., Mozgeris G., Puodžiūnas M., Rutkauskas A., Tebėra A., Vitunskas D., Miško naudojimas ir logistika. Vadovėlis, Akademija (Kauno raj.), 2008, 400 p.
4.	P.A. Longley, M.F. Goodchild, D.J. Maguire, D.W. Rhind, 2011, Geographic Information Systems and Science, 3rd edition, Wiley, 539 p.

5.	Scientific publications from Science Direct, EBSCOhost Web
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Course programme designed by

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