

## MODULE INFORMATION SHEET

<b>Name of Module Unit</b>	<b>Remote Sensing Imagery Processing</b>
Name in polish language	Analiza obrazowań satelitarnych
Module type	compulsory-/ elective
Form of studying	full-time day courses
Level of study	graduate course (M.Sc. level)
Type of study ( for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environment Protection Engineering
Responsible department	Dept. of Informatics and Environment Quality Research
Responsible person	Prof dr hab. inż. Jarosław Zawadzki

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
4	15			30		3

### Learning outcomes (knowledge, skills, competences)

The objective of the course is to teach the students skills of remote sensing imagery processing, as well as to give to them preliminary concepts of remote sensing of earth surface. The general approach of the course is task-based learning, with an emphasis on computer practice, supplemented only by necessary amount of theory. Beyond exploring the remote sensing imagery processing this course relates students to chosen, relevant environmental issues. The course is intentionally based on ESA Sentinels imagery and ESA data infrastructure namely Space Hub.

### Prerequisites

Calculus I, II, III  
 Information Technology  
 Physics I, II  
 Statistics in Environmental Sciences

### Rules for integrated grade setting

Integrated grade is calculated from the formula:  $0.5E + 0.5CE$ , where E is final exam grade, , CE denotes for home works and active participation.

### Recommended readings

1. Campbell J.B., Introduction to remote sensing. Wyd. 4. Taylor & Francis, 2006. str. 437.  
 2. Remote Sensing and Image Interpretation, 6th Edition, Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman (University of Wisconsin, Madison), 2008.  
 Exemplary pages on remote sensing and image interpretation:  
Internet sources:  
 Copernicus Open Access Hub  
<https://scihub.copernicus.eu/European Space Agency Education>  
 Science toolbox exploitation platform  
<http://step.esa.int>

## Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	Basic concepts of remote sensing. Satellite observations of the Earth.	2	S
2	Different types of remote sensing imagery and their properties.	3	S
3	Acquisition of free satellite data.	2	S
4	Satellite image preprocessing. Filtering, contrast enhancement etc. Composite images.	1	S
5	Radiometric calibration and geometric correction of satellite images.	3	S
6	Supervised and unsupervised methods of classification.	2	S
7	Examples of processing environmental satellite imagery: a) optical data - vegetation condition assessment, b) microwave data – observations of soil moisture	2	S
<b>Total</b>		<b>15</b>	<b>hours</b>

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

### Lecturers

Prof. dr hab. inż. Jarosław Zawadzki

### Assessment method

Final exam

## Contents of computer exercises

	Topics	Time (hrs.)	Scope (S / Ex)
1	Introduction. Satellite imagery Sources - Space HUB.	2	S
2	Introduction to SNAP. Opening, viewing and saving images.	2	S
3	Colour Manipulation. RGB composition.	2	S
4	Reprojection and Digital Elevation Model.	2	S
5	Band Math and Masking.	2	S
6	Vegetation Indices	2	S
7	Analysis tools	2	S
8	Advanced Analysis – Graded assignment	2	S
9	Project – Using previously introduced RS techniques on chosen area of interest.	12	S
9	Chosen extra topic – wildfires, floods or hurricanes analysis.	2	Ex
<b>Total</b>		<b>30</b>	<b>hours</b>

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

### Persons responsible for computer exercises

Dr Karol Przeździecki, Ph.D students of Department of Informatics and Environment Quality Research

### Assessment method for computer exercises

The presence and active participation (20%), Graded assignment (30%) Final Project (50%).