UCLouvain

lgeo1343

2022

Earth observation by satellite

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Lambin Eric ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	Prerequisites : Notions of statistics, general physics course. The course has three components: 1: The presentation during lectures of the theoretical and methodological bases of remote sensing; 2: The application of image processing and interpretation methods to Landsat data on a region of Belgium, using image processing software on PC; 3: The exploration of a large range of remote sensing applications and of the methods used in each application, on the basis of CD-ROMs demonstrating case studies. Physical bases of remote sensing: - Definitions: radiant energy, radiant flux, radiant flux density, radiance; - Interactions between energy and the surface of the earth: laws of Stefan-Boltzmann and Wien. - Spectral reflectance curves ; - Atmospheric effects; - Physical interactions with thermal infra-red energy. The sensors used in remote sensing: - Landsat MSS and TM, SPOT; - AVHRR, Vegetation, MODIS; - the new high spatial resolution sensors. Image processing: - Corrections for non-systematic and systematic geometric distortions - Radiometric corrections - Extraction of statistics from images - Contrast enhancement - Spatial filtering - Supervised classification - Unsupervised classification - Classification errors estimation - Change detection methods - Multispectral transformations: Tasseled cap transformation; principal components analysis; - Notions of microwave remote sensing. Practical work: Processing of a Landsat TM image of Belgium: 1st session Introduction to image processing software 2nd session Color composites and contrast enhancement 3rd session Design of a scientific project 4th and 5th sessions Geometric correction 6th session Unsupervised classification 7th session Supervised classification 8th session Accuracy assessment of classification
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 Knowledge : The students will acquire a good knowledge of the different applications of remote sensing, and a capacity to decide which sensors and which image processing and interpretation methods are most appropriate for a given application. Skills : The students will gain understanding of the bases of remote sensing and will be able to process and interpret satellite data on a given region, using a image processing software on PC. Emphasis is put on optical remote sensing for terrestrial ecosystem applications.
Bibliography	• Richards J. 1986. remote Sensing Digital Image Analysis, Springer-Verlag, 2ème édition
Faculty or entity in charge	GEOG

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Biology of Organisms and Ecology	BOE2M	5		
Master [120] in Environmental Science and Management	ENVI2M	5		
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	5		
Master [120] in Population and Development Studies	SPED2M	5		
Minor in Geography	MINGEOG	5		
Master [120] in Physics	PHYS2M	5		
Bachelor in Geography : General	GEOG1BA	5		