lbres2101

2021

Smart technologies for environmental engineering

4.00 credits	32.5 h + 20.0 h	Q1

Teacher(s)	Jonard François ;Lambot Sébastien (coordinator) ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	- Applied geomatics. - Soil physics
Main themes	This course aims to teach technologies for characterization and monitoring of agroecosystems. In particular, geophysical imaging and characterization techniques of soil properties are presented, such as ground penetrating radar, electromagnetic induction or electrical tomography. Also, the course discusses the use of drones for environmental monitoring, including multispectral, thermal infrared, LiDAR sensors as well as photogrammetry. Fundamental concepts, instruments and methods of signal analysis will be particularly seen in-depth. The student will be made familiar with these tools through practical works and an integrated project.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 At the end of this teaching unit, the student is able to: a. Contribution of the activity to the program Learning Achievements (LA) M1.1; M1.2; M1.3; M2.1; M2.2; M2.3; M4.5; M5.1; M5.6; M5.8; M6.1; M6.2; M6.4; M6.9; M7.1; M7.2; M8.1; M8.2; M8.3; M8.4; b. Specific formulation for this LA activity of the program At the end of this course (3 ECTS), students will be able to: - understand the concepts of the different environmental sensors (geophysics, remote sensing); - understand and implement different signal processing methods; - develop a critical analysis on the application of these technologies; - to master the use of some of the instruments studied.
Evaluation methods	- Written exam. - Integrated project report (by group). - Seminar evaluation (by group). The evaluation focuses on the quality and thoroughness of the presentation, the quality of the answers and arguments put forward during the debate, the communicative quality (quality of the slides, technical quality, oral expression).
Teaching methods	- Lectures. - Practical work in a team with an integrated project involving the production of a collective report. - Seminars allowing to deepen a scientific question related to the course and to develop the reading of the texts in English and the competence of professional communication.
Content	Theorical class : - Geophysical techniques: ground penetrating radar, electromagnetic induction, radiometry, electrical tomography, seismic, reflectometry. - Drone remote sensing techniques: thermal infrared sensor, multispectral sensor, LiDAR. - Sensor networks - Signal processing methods: inversion, tomography, photogrammetry, data fusion, artificial neural networks.
Inline resources	Moodle
Bibliography	- Diapositives du cours - Livres de référence recommandés.
Other infos	This course can be given in English. Part of this course (remote sensing by drone) is part of the University Certificate in Applied Geomatics accessible to professionals as part of continuing education.

Faculty or entity in charge	AGRO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Agricultural Bioengineering	BIRA2M	4		🔍
Master [120] in Environmental Bioengineering	BIRE2M	4		🔍
Master [120] in Forests and Natural Areas Engineering	BIRF2M	4		🔍
Master [120] in Chemistry and Bioindustries	BIRC2M	4		🔍