LBRTI2102

2014-2015

Process modelling and forescasting systems

5.0 credits	30.0 h + 15.0 h	1q

Teacher(s) :	Hanert Emmanuel ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	Lecture notes and Matlab programs are made available on icampus
Prerequisites :	Basic courses in mathematics (LMAT1111, LBIR1200) and some knowledge of Matlab (LBIR1204, LBIR1305).
Main themes :	This module will help students to develop a thorough knowledge of the different steps required to setup a model and learn how to use simulation tools. The students will be able to setup a complete modelling approach in order to forecast and anticipate the behaviour of complex systems. This module considers the propagation of errors and uncertainties in models and hence allows estimating the risk associated to a particular decision.
Aims :	a. Contribution de l'activité au référentiel AA (AA du programme) 1.2 2.1, 2.2, 2.3, 2.4 3.1, 3.2, 3.3, 3.4 6.1, 6.2, 6.3, 6.5, 6.8 b. Formulation spécifique pour cette activité des AA du programme By the end of the LBRTI2102 module, students will be able to: · Name, describe, explain the theoretical concepts related to the mechanistic approach to analyse and model environmental processes; · Explain mathematical concepts and use computational tools to model the space-time dynamics of these processes; · Use these concepts and tools in an operational fashion in order to model the processes that drive realistic environmental systems in the context of an individual project; · Present a detailed justification of the methodological choices that have been made to analyse the system under study; · Write a brief report, with a solid discussion based on the modelling results and appropriately illustrated with graphs and charts, using accurate and appropriate scientific vocabulary. *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods :	Individual report on a personal project to be handed in by the end of term and a written exam during the exam session.
Teaching methods :	The course is taught through lectures that include many practical examples. Practicals are explained by a teaching assistant who provides a hands-on guidance to the students to apply the concepts taught during the lectures.
Content :	The course covers the following elements and illustrates them with examples modelled "with Matlab: 1. Time-dependent population models. 2. 1D and 2D transport models and numerical schemes to discretize advection-diffusion-reaction equations. 3. Model application in hydrodynamics, surface runoff, ecology and epidemiology. Cellular automata models and their application to model the dynamics of epidemics and invasive plant species.
Bibliography :	1. Lecture notes and Matlab programs available on iCampus. 2. Reading list available on iCampus.
Other infos :	Lecture notes are written in English. The course can be taught in English or in French.
Cycle and year of study :	> Master [120] in Agricultural Bioengineering > Master [120] in Chemistry and Bio-industries > Master [120] in Forests and Natural Areas Engineering > Master [120] in Environmental Bioengineering

Faculty or entity in charge:	AGRO