UCLouvain

lgeo2130

2017

Geographic modelling

5 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Deleersnijder Eric ;Vanwambeke Sophie ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	At the end of this course, the students will be able to: · Identify and characterize a model and understand the mathematics of a process-based model; · Translate a physical, environmental and/or spatial process into mathematical language; · Grasp all steps of a modelling process, from the statement of a question to the validation of results; · Start engaging with professionals of environmental modelling and management in various settings. Contribution to the acquisition and evaluation of the following learning outcomes of the programme in geography (general and climatology): · AA 1.1, AA 1.2, AA 1.4, AA 1.6, and particularly AA.1.7 and AA 1.8 · AA 3.3, AA 3.4 · AA 4.1, AA 4.2 · AA 5.5 · AA 6.1, 6.2 Most importantly, these learning outcomes are central to this course: · AA 4.3, AA 4.4, AA 4.5
Aims	*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	Homeworks and practical reports; written exam.
Teaching methods	Classroom lectures and practical sessions, involving active learning methods. All lectures are in English. The course material and practical notes are in English and French "
Content	The course includes two parts. The first half focuses on differential models. The second half looks into spatial modelling and modelling practice. The course starts by a general introduction on modelling. The following topics are dealt with: · How to model? The various steps of modelling; · Typology of models; · Differential models: linear ordinary differential problems (e.g. first order decay); · Differential models: non-linear ordinary differential problems (e.g. population modelling, prey-predator populations, epidemiological model); · Differential models: space-time dependency; · Spatial models: making space explicit, self-organising systems (e.g. epidemic diffusion, erosion processes); · Spatial models: interacting, spatially-explicit objects: agent-based models (e.g. land use change) How to model? Model validation.
Inline resources	Slides, lecture notes and additional reading material on Moodle (https://moodleucl.uclouvain.be/?lang=en)
Bibliography	Although none of them is mandatory reading, the following books are useful sources of information: Mulligan M., Wainwright J., 2004, Modelling and model building, In: Environmental modelling. Finding Simplicity in Complexity, Wainwright J., Mulligan M. (eds.). Chichester: Wiley. Smith J., Smith P., 2007, Environmental modelling. An Introduction. Oxford: Oxford University Press Kot M; 2001, Elements of Mathematical Ecology, Cambridge University Press
Faculty or entity in charge	GEOG

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Forests and Natural Areas Engineering	BIRF2M	5		
Master [120] in Agricultural Bioengineering	BIRA2M	5		
Master [60] in Geography : General	GEOG2M1	5		
Master [120] in Chemistry and Bioindustries	BIRC2M	5		
Master [120] in Geography : General	GEOG2M	5		
Master [120] in Environmental Bioengineering	BIRE2M	5		
Master [120] in Agriculture and Bio-industries	SAIV2M	5		