LGEO2130

2016-2017

Geographic modelling

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Deleersnijder Eric ; Vanwambeke Sophie ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Main themes :	Differential models Introduction State variables, parameters Initial conditions, boundary conditions, etc Linear ordinary differential problems General solutions Equilibrium points (stability, instability, oscillations) Conservation/dissipation of energy (in a broad sense) Example (Mururoa Lagoon) Non-linear ordinary differential problems Equilibrium points (stability, instability, oscillations) Conservation/dissipation of energy (in a broad sense) Qualitative notions of bifurcation Qualitative notions on chaos and predictability Examples (logistic model, prey-predator model, etc.) Space- and time-dependent models Partial differential problems Integral properties Box-model approximations Example (Exxon Valdez oil spill, Alaska) Parameter optimisation, validation and sensitivity analysis Spatial modelling Self-organisation in systems Cellular automata Agent-based models Examples are taken in physical geography, natural resource management and use, spatial epidemiology, history of land use Modelling techniques UML as an aid to conceptual modelling Model evaluation: sensitivity, uncertainty, validation Measuring landscape structure
Aims :	Extend knowledge of modelling techniques focusing on geographical processes. More specifically, models based on: -spatio-temporal analysis -dynamic approaches that use differential equations -landscape indices and fractals The competences to be acquired during the course include: -complex spatial analyses -use of softwares for modelling dynamic systems -mathematical methods in geography *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".*
Content :	Differential models Introduction State variables, parameters Initial conditions, boundary conditions, etc Linear ordinary differential problems General solutions Equilibrium points (stability, instability, oscillations) Conservation/dissipation of energy (in a broad sense) Example (Mururoa Lagoon) Non-linear ordinary differential problems Equilibrium points (stability, instability, oscillations) Conservation/dissipation of energy (in a broad sense) Qualitative notions of bifurcation Qualitative notions on chaos and predictability Examples (logistic model, prey-predator model, etc.) Space- and time-dependent models Partial differential problems Integral properties Box-model approximations Example (Exxon Valdez oil spill, Alaska) Parameter optimisation, validation and sensitivity analysis Systems analysis in Geography Self-organisation in human systems Dynamic of urban centres Intra-urban model Case study : modelling the evolution of the United States (1950-1970)
Other infos :	Prerequisites GEO1342 - Geographical Information Systems GEO1341 - Statistical modelling Mathematics All lectures are in English. The course material and practical notes are in English and French

Faculty or entity in charge:	GEOG

Programmes / formations proposant cette unité d'enseignement (UE)

Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Forests and Natural Areas Engineering	BIRF2M	5	-	
Master [120] in Agriculture and Bio-industries	SAIV2M	5	-	
Master [120] in Agricultural Bioengineering	BIRA2M	5	-	
Master [120] in Environmental Bioengineering	BIRE2M	5	-	
Master [60] in Geography : General	GEOG2M1	5	-	
Master [120] in Chemistry and Bioindustries	BIRC2M	5	-	
Master [120] in Geography : General	GEOG2M	5	-	