




5.00 credits

30.0 h + 30.0 h

Q2

Teacher(s)	Deleersnijder Eric ;Vanwambeke Sophie ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Elementary calculus and statistics
Main themes	<p>At the end of this course, the students will be able to:</p> <ul style="list-style-type: none"> <li>· Identify and characterize a model and understand the mathematics of a process-based model;</li> <li>· Translate a physical, environmental and/or spatial process into mathematical language;</li> <li>· Grasp all steps of a modelling process, from the statement of a question to the validation of results;</li> <li>· Start engaging with professionals of environmental modelling and management in various settings.</li> </ul> <p>Contribution to the acquisition and evaluation of the following learning outcomes of the programme in geography (general and climatology):</p> <ul style="list-style-type: none"> <li>· AA 1.1, AA 1.2, AA 1.4, AA 1.6, and particularly AA.1.7 and AA 1.8</li> <li>· AA 3.3, AA 3.4</li> <li>· AA 4.1, AA 4.2</li> <li>· AA 5.5</li> <li>· AA 6.1, 6.2</li> </ul> <p>Most importantly, these learning outcomes are central to this course:</p> <ul style="list-style-type: none"> <li>· AA 4.3, AA 4.4, AA 4.5</li> </ul>
Learning outcomes	
Evaluation methods	<p>Evaluation :</p> <p>5% math homework</p> <p>35 % homeworks on part 1</p> <p>40% reports on part 2</p> <p>20% joint oral exam on both parts of the course</p> <p>August session: Assignment on part 1 (40%), assignment on part 2 (40%), oral exam (20%). No marks will be sent forward between sessions.</p>
Teaching methods	<p>Classroom lectures and practical sessions, involving active learning methods.</p> <p>All lectures are in English. The course material and practical notes are in English and French.</p>
Content	<p>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.</p> <p>The following topics are dealt with:</p> <ul style="list-style-type: none"> <li>· How to model? The various steps of modelling;</li> <li>· Typology of models;</li> <li>· Differential models: linear ordinary differential problems (e.g. first order decay);</li> <li>· Differential models: non-linear ordinary differential problems (e.g. population modelling, prey-predator populations, epidemiological model);</li> <li>· Differential models: space-time dependency;</li> <li>· Spatial models: making space explicit, self-organising systems (e.g. epidemic diffusion, erosion processes);</li> <li>· Spatial models: interacting, spatially-explicit objects: agent-based models (e.g. land use change)</li> </ul> <p>How to model? Model validation.</p>
Inline resources	Slides, lecture notes and additional reading material on Moodle.
Other infos	Prerequisites LGEO1342 - Geographical Information Systems (or similar); LGEO1341 - Statistical modelling (or similar); Mathematics (or similar)

Faculty or entity in charge	GEOG
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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Chemistry and Bioindustries	BIRC2M	5		
Master [120] in Agriculture and Bio-industries	SAIV2M	5		
Master [120] in Geography : General	GEOG2M	5		
Master [120] of Education, Section 4 : Geography	GEOG2M4	5		