




5 credits

22.5 h + 22.5 h

Q1

Teacher(s)	Goosse Hugues ;van Ypersele de Strihou Jean-Pascal ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	Description of the climate system and its components ; energy balance, hydrological cycle and carbon cycle ; key feedback mechanisms and climate sensitivity to external perturbation ; natural variability of climate at all time scales ; hierarchy of models of the climate system ; greenhouse effect and climate change induced by human activities.
Aims	<p><b>a. Contribution of the teaching unit to the learning outcomes of the programme (PHYS2M and PHYS1M)</b>                      A1.1, A.1.2, A1.5                      A2.3, A2.5                      A3.3                      A4.1, A4.2                      A5.1, A5.4                      A6.1, A6.2, A6.3, A6.5                      A7.2, A7.3, A7.4, A7.5, A7.6                      1 A8.1</p> <p><b>b. Specific learning outcomes of the teaching unit</b>                      At the end of this teaching unit, the student will be able to :</p> <ol style="list-style-type: none"> <li>1. describe the main interactions between the components of the climate system ;</li> <li>2. develop a simple model of the climate system ;</li> <li>3. simulate the behavior of the climate system at various time scales ;</li> <li>4. choose the appropriate model according to the climatic problem ;</li> <li>5. estimate the uncertainties of observations and climate models ;</li> <li>6. assess the relevance of a climate theory based on available information ;</li> <li>7. structure the results of a model of a complex system.</li> </ol> <p>-----  <i>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".</i></p>
Evaluation methods	<p><b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b>                      Written exam: short development.                      Individual oral examination based on a group project.                      Project report.</p>
Teaching methods	<p><b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b>                      Lectures.                      Integrative project.                      Computer simulation sessions.                      Online exercises.                      List of articles to read.</p>
Content	<ol style="list-style-type: none"> <li>1. Description of the climate system and its components</li> <li>2. Energy balance, water cycle and carbon cycle</li> <li>3. Modelling of the climate system</li> <li>4. Response of the climate system to a perturbation</li> <li>5. Brief history of climate: causes and mechanisms</li> <li>6. Future climate change</li> </ol>
Bibliography	Goosse H., 2015, Climate System Dynamics and Modelling, Cambridge University Press, (ISBN-13: 9781107445833), 358 pages.

Faculty or entity in charge	PHYS
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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Geography : General	<a href="#">GEOG2M</a>	5		
Master [120] in Agricultural Bioengineering	<a href="#">BIRA2M</a>	5		
Master [120] in Environmental Bioengineering	<a href="#">BIRE2M</a>	5		
Master [120] in Philosophy	<a href="#">FILO2M</a>	5		
Master [120] in Geography : Climatology	<a href="#">CLIM2M</a>	5		
Master [120] in Physics	<a href="#">PHYS2M</a>	5		
Master [120] in Ethics	<a href="#">ETHI2M</a>	5		
Additional module in Physics	<a href="#">APPHYS</a>	5		
Master [120] in Chemistry and Bioindustries	<a href="#">BIRC2M</a>	5		
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	<a href="#">ENVI2MC</a>	5		
Master [120] in Environmental Science and Management	<a href="#">ENVI2M</a>	5		
Master [60] in Physics	<a href="#">PHYS2M1</a>	5		