

5.00 credits

30.0 h + 30.0 h

Q2

Teacher(s)	Van Roy Peter ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	<p>This course assumes the student already masters the discrete mathematical skills targeted by the course LINFO1114</p> <p><i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i></p>
Main themes	<ul style="list-style-type: none"> <li>• Graphs (basic concepts, paths and connectivity)</li> <li>• Applications of graphs, for example, to model social networks (links, homophilia, closing)</li> <li>• Discrete structures on the Internet: graphs and properties of graphs, giant components, strong and weak links, triadic closure, structural equilibrium, equilibrium theorem, web structure, PageRank, power laws, the long tail</li> <li>• Introduction to game theory</li> </ul>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>Given the learning outcomes of the "Bachelor in Engineering" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes:</p> <ul style="list-style-type: none"> <li>• S1.I1, S1.G1</li> <li>• S2.2</li> </ul> <p>Students completing successfully this course will be able to</p> <ol style="list-style-type: none"> <li>1 identify and precisely define the basic concepts of graphs and trees by providing contextualized examples that highlight them.</li> <li>explain various methods of traversing graphs</li> <li>model various real-world problems encountered in computer science using the appropriate forms of graphs and trees, for example social networks and the Web</li> <li>explain the main concepts of game theory (the type of game, the type of strategy of the agents) with the help of appropriate examples</li> <li>define and interpret concepts with precision</li> <li>avoid misinterpretations and detect reasoning errors</li> </ol>
Evaluation methods	<ul style="list-style-type: none"> <li>• Dispensatory test 25% (around week 7)</li> <li>• Project 25%</li> <li>• Final exam 50% (or 75% if redoing test part)</li> </ul> <p>The project is mandatory and is done during the quadrimester. It can only be done only once and it counts for the whole academic year. The optional dispensatory test and the final exam may be done in auditorium or online, depending on university requirements.</p>
Teaching methods	<ul style="list-style-type: none"> <li>• Weekly lectures (in auditorium or online, according to university requirements)</li> <li>• Practical lab sessions in the computer room every week, to solve simplified problems using concepts explained during the lectures.</li> <li>• One major design and programming project to apply these concepts to a more complex application</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Graphs (basic concepts, paths and connectivity).</li> <li>• Graph applications, for example modeling social networks (links, homophily, closure).</li> <li>• Discrete structures on the Internet: graphs and graph properties, giant components, strong and weak links, triadic closure, structural equilibrium, equilibrium theorem, structure of the Web, PageRank, power laws, the long tail.</li> <li>• Introduction to game theory and application to Internet graphs.</li> </ul>
Inline resources	LINFO1115 Moodle.
Bibliography	David Easley and Jon Kleinberg, Networks, Crowds and Markets: Reasoning About a Highly Connected World, Cambridge University Press, 2010.

<p>Other infos</p>	<p>With respect to the AA benchmark of the programme "Bachelier en sciences informatiques", this course contributes to the development, acquisition, and evaluation of the following learning outcomes:</p> <ul style="list-style-type: none"> <li>• S1.I1, S1.G1</li> <li>• S2.2</li> </ul> <p>Students who have succeeded in this course will be able to:</p> <ul style="list-style-type: none"> <li>• precisely identify and define basic concepts of graphs and trees with contextual examples that illuminate them,</li> <li>• make explicit diverse methods of graph traversal,</li> <li>• model various problems of the real world encountered in information technology using the appropriate graphs and trees, for example in social networks and the Web,</li> <li>• make explicit the principal concepts of game theory (form of game, form of agent strategy) by means of appropriate examples,</li> <li>• apply these concepts to Internet structures,</li> <li>• define and interpret rigorously the concepts,</li> <li>• avoid wrong interpretations and detect reasoning errors.</li> </ul>
<p>Faculty or entity in charge</p>	<p>INFO</p>

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Computer Science	<a href="#">SINF1BA</a>	5	<a href="#">LINFO1114</a>	