




4.0 credits

22.5 h + 22.5 h

2q

Teacher(s) :	Hanert Emmanuel (coordinator) ; Vanclooster Marnik ; Bogaert Patrick ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	Lecture notes and sample Matlab programs are available on icampus.
Prerequisites :	Basic courses in mathematics (LMAT1111, LBIR1200) and in statistics (LBIR1203). <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>
Main themes :	This course will help students to develop a working knowledge of computer science through the use of the Matlab software and the application of mathematics in the field of biological, agricultural and environmental engineering.
Aims :	<p>a. Contribution de l'activité au référentiel AA (AA du programme)</p> <p>1.1 2.1,2.2,2.3 3.5,3.6,3.7 5.2,5.3 6.2,6.4,6.6,6.8</p> <p>b. Formulation spécifique pour cette activité des AA du programme</p> <p>At the end of the course LBIR1204 , students will be able to:</p> <ul style="list-style-type: none"> <li>· Identify, describe and explain the theoretical concepts of computer programming;</li> <li>· Design simple models using concepts of applied mathematics;</li> <li>· Apply these concepts to produce computer programs to solve applied problems related to their training in bioengineering;</li> <li>· Mobilize and integrate computer skills, statistics and applied mathematics to analyze and solve a multidisciplinary problem in the field of bioengineering through computer tools at its disposal;</li> <li>· Conduct a team project by planning and coordinating the different stages of this project based on predefined targets and imposed deadlines;</li> <li>· Communicate via a written report the results and main conclusions related to the project in a rigorous framework and using a style and form meeting scientific standards;</li> <li>· Orally communicate the main results of the project with clear and rigorous visuals;</li> <li>· Justify and defend the methodological choices that were made during the analysis and which allowed drawing conclusions.</li> </ul> <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 :	<ol style="list-style-type: none"> <li>1. For the "Computer Science" part, the assessment is based on a written exam during the exam session.</li> <li>2. For the "Applied Mathematics" part, the assessment is based on the report submitted by each students group and on the oral presentation of the results made "by each group during the exam session.</li> </ol> <p>The final mark is a weighted average of the marks obtained for both parts of the course.</p>
Teaching methods :	The course is taught by means of lectures that include many practical examples. Practical's classes led by a computer assistant are also provided to help students to become familiar with Matlab before the project begins. Practical's sessions dedicated to the project are also planned.
Content :	<p>The "Computer Science" part of the course develops the following concepts:</p> <ol style="list-style-type: none"> <li>1. Operations on vectors and matrices</li> <li>2. Exchange of information through input and output instructions</li> <li>3. If/else, for, while and switch instructions</li> <li>4. Principles of modular programming</li> <li>5. Logical operators and associated functions</li> <li>6. Data structures in Matlab</li> <li>7. Graphics and Data Visualization</li> <li>8. Symbolic computations in Matlab</li> <li>9. Algorithms for sorting, searching and indexing</li> <li>10. File management of complex data</li> </ol>

	<p>The "Applied Mathematics" part of the courses follows a project learning method. Most of this part of the course takes place in the computer room and involves a large component of personal work. The study of a real case is proposed to groups of four students. The project consists in the following steps:</p> <ol style="list-style-type: none"> <li>1. Analysis of raw data and development of a Matlab program to format that data files used for the following steps.</li> <li>2. Mathematical and statistical formulation of the problem.</li> <li>3. Description of a numerical method to solve the mathematical problem.</li> <li>4. Matlab implementation of the numerical algorithm.</li> <li>5. Writing by each group of a report and oral presentation of the main results.</li> </ol>
<p><b>Bibliography :</b></p>	<ol style="list-style-type: none"> <li>1. For the "Computer Science" part, a set lecture notes written in English as well as many examples of Matlab programs will be made available on icampus, reference books on Matlab programming are available at the main library.</li> <li>2. For the "Applied Mathematics" part, booklets, reference book and detailed instructions will be made available on icampus</li> </ol>
<p><b>Faculty or entity in charge:</b></p>	<p>AGRO</p>

<b>Programmes / formations proposant cette unité d'enseignement (UE)</b>				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Minor in Statistics	LSTAT100I	4	-	
Bachelor in Geography : General	GEOG1BA	4	LMAT1111F and LMAT1111G	
Bachelor in Bioengineering	BIR1BA	4	LBIR1110 and LMAT1111E	
Master [120] in Environmental Science and Management	ENVI2M	4	-	