


Teacher(s)	Vande Kerckhove Corentin ;Vitale Enrico ;
Language :	French
Place of the course	Mons
Prerequisites	The mathematical background from a program of at least 4h mathematics in final year of school (upgrading, "Coup de pouce", given in the beginning of the year).
Main themes	<p>This course has two parts:</p> <p>A. Analysis of real functions (30h + 20h)</p> <ul style="list-style-type: none"> <li>• Real functions;</li> <li>• Limit and continuity;</li> <li>• Infinitesimal calculus, in particular: (i) differential calculus for real functions of a single real variable; (ii) Taylor polynomials</li> <li>• Introduction to integral calculus for real functions of a single real variable;</li> </ul> <p>B. Linear Algebra (15h Theory) + 10h Exercises)</p> <ul style="list-style-type: none"> <li>• Systems of linear equations;</li> <li>• Gauss-Jordan elimination method;</li> <li>• Vectors, vector spaces, linear independence, bases;</li> <li>• Matrixes, matrix algebra, determinants, matrixes inversion, linear independence and rank of a matrix, eigenvalues and eigen vectors</li> </ul>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>1 This course must enable students to understand the mathematics encountered in economics and management, and afterwards, to acquire the capacity to manipulate the notions studied to solve problems by themselves.</p>
Evaluation methods	<p>The final grade is the sum of two marks: T = the SMART week test gives a bonus between 0 and 2 points; E = Examination in session gives a score between 0 and 20 points. The final grade is T + E (if it exceeds 20 points, it is reduced to 20). If you have to represent the exam in June or September, the bonus points T remain acquired.</p> <p>The test: Duration 1 hour. Calculator and gsm prohibited. The test consists of one or two exercise-type questions (closed book written). The correction will be made in audience right after the end of the test. Examination: closed book written exam lasting between 2 and 3 hours. Calculator and mobile phone prohibited. The exam consists of two or three questions including exercise-type questions and reflection questions. The answer key will be available on the Student Corner after the end of the session and before the copy consultation session.</p>
Teaching methods	<p>The lecture aims to introduce the theory from simple problems and to illustrate it by exercises solved in audience. The lecture, online syllabus, note taking and personal elaboration should help you strengthen your analysis and synthesis skills.</p> <p>The TP sessions should allow you to appropriate the tools introduced in the lecture by exercises of different levels (calculation, reflection, synthesis, context, etcetera). TP sessions are also an opportunity to learn how to properly write a mathematical statement or exercise.</p> <p>Both during the lecture and in the TP session, your questions are always welcome. After each supervised activity (lecture or session TP) an autonomous work of revision is necessary to be able to profit fully from the following activity.</p> <p>Much of the subject matter covers the material seen in high school (particularly with regard to the study of the functions of a real variable). The basic objective is to go through the subject by identifying the essential results and techniques. The second objective is to deepen the subject by highlighting the links between the different parts, by digging the more delicate points, by questioning the reasons that motivate the theory and finally by refining the rigour and flexibility with which the studied tools and concepts are manipulated. In the linear algebra part, which goes far beyond high school achievement, your ability to abstract thinking will be solicited and strengthened.</p> <p>The use, in economics and in management sciences, of the mathematical concepts presented in the course will be dealt with during some course sessions which are specifically dedicated to it.</p>
Content	In this course, two major mathematical themes are addressed: the study of the functions of a real variable (elements of infinitesimal calculus and integral calculus) and the study of systems of linear equations (elements of matrix calculus and introduction to linear algebra). These themes are approached with a view to their use in economics and management sciences.

	<p>Contents</p> <p>1. Operations on fractions. General information on functions. Lines, parabolas and polynomials. Rational functions, powers and roots. Exponential function and logarithm function. Trigonometric and inverse trigonometric functions. Operations on functions.</p> <p>2. Continuity. Fundamental theorems on continuity. Limits to infinity and at a point. Asymptotes. Definition and properties of the derivative. Fundamental theorems on derivatives. Growth, decrease and optimization of a function. Taylor polynomial.</p> <p>3. Definition and geometric interpretation of the Riemann integral. Fundamental theorem of integral calculus. Calculation of the primitives. Improper integrals.</p> <p>4. Linear systems, operations on matrices, rank and Gaussian method. Determinant and invertible matrices.</p> <p>5. Linear subspaces of <math>\mathbb{R}^n</math>, linear combinations, bases and dimension.</p>
Inline resources	<p>The syllabus (still in the finalization phase), the exercises with solution for TP sessions and the old exam questions with detailed correction are available on the Student Corner website. The solutions for the exercices of the TP become available only after the TP session.</p> <p>To review your prior knowledge, you can use the site <a href="https://www.auto-math.be">https://www.auto-math.be</a></p>
Other infos	<p>Attention: the schedule does not happen again the same week by week. It is therefore necessary to regularly consult the Student Corner for more details.</p> <p>Beyond the prior knowledge, what matters above all is the motivation to learn and understand and the goodwill to accomplish the necessary independent work.</p> <p>This teaching has two objectives:</p> <ul style="list-style-type: none"> <li>- Allow you to be comfortable with the basic mathematical tools that will intervene in the rest of your course at the university (whether in management sciences or management engineering).</li> <li>- Help you develop your capacity for analysis and synthesis.</li> </ul>
Faculty or entity in charge	CLSM

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor : Business Engineering	<a href="#">INGM1BA</a>	5		
Bachelor in Management	<a href="#">GESM1BA</a>	5		