UCL Université catholique de Louvain

LMAT1121

2014-2015

Mathematical analysis 1

5.0 credits	30.0 h + 30.0 h	1q

Teacher(s) :	Van Schaftingen Jean ; Ponce Augusto ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=MAT1121-001+
Prerequisites :	& mp;lt;!--{cke_protected}{C}%3C!%2D%2D%0A%20%2F*%20Font%20Definitions%20*%2F%0A%40font-face%0A%09%7Bfont-family%3A%22Cambria%20Math%22%3B%0A%09panose-1%3A2%204%205%203%205%204%206%203%202%204%3B%0A%09mso-font-charset%3A0%3B%0A%09mso-generic-font-family%3Aauto%3B%0A%09mso-font-pitch%3Avariable%3B%0A%09mso-font-signature%3A3%200%200%200%201%200%3B%7D%0A%40font-face%0A%09%7Bfont-family%3A%22%E3%83%92%E3%83%A9%E3%82%AE%E3%83%8E%E8%A7%92%E3%82%B4%20Pro%20W3%22%3B%0A%09mso-font-charset%3A78%3B%0A%09mso-generic-font-family%3Aauto%3B%0A%09mso-font-pitch%3Avariable%3B%0A%09mso-font-signature%3A-536870145%202059927551%2018%200%20131085%200%3B%7D%0A%20%2F*%20Style%20Definitions%20*%2F%0Ap.MsoNormal%2C%20li.MsoNormal%2C%20div.MsoNormal%0A%09%7Bmso-style-unhide%3Ano%3B%0A%09mso-style-qformat%3Ayes%3B%0A%09mso-style-parent%3A%22%22%3B%0A%09margin%3A0cm%3B%0A%09margin-bottom%3A.0001pt%3B%0A%09mso-pagination%3Awidow-orphan%3B%0A%09font-size%3A12.0pt%3B%0A%09font-family%3A%22Times%20New%20Roman%22%3B%0A%09mso-fareast-font-family%3A%22Times%20New%20Roman%22%3B%0A%09mso-ansi-language%3AEN-US%3B%0A%09mso-fareast-language%3AEN-US%3B%7D%0Ap.CorpsA%2C%20li.CorpsA%2C%20div.CorpsA%0A%09%7Bmso-style-name%3A%22Corps%20A%22%3B%0A%09mso-style-unhide%3Ano%3B%0A%09mso-style-parent%3A%22%22%3B%0A%09margin%3A0cm%3B%0A%09margin-bottom%3A.0001pt%3B%0A%09mso-pagination%3Awidow-orphan%3B%0A%09font-size%3A12.0pt%3B%0A%09mso-bidi-font-size%3A10.0pt%3B%0A%09font-family%3AHelvetica%3B%0A%09mso-fareast-font-family%3A%22%E3%83%92%E3%83%A9%E3%82%AE%E3%83%8E%E8%A7%92%E3%82%B4%20Pro%20W3%22%3B%0A%09mso-bidi-font-family%3A%22Times%20New%20Roman%22%3B%0A%09color%3Ablack%3B%0A%09mso-font-kerning%3A.5pt%3B%0A%09mso-ansi-language%3AFR%3B%7D%0A.MsoChpDefault%0A%09%7Bmso-style-type%3Aexport-only%3B%0A%09mso-default-props%3Ayes%3B%0A%09font-size%3A10.0pt%3B%0A%09mso-ansi-font-size%3A10.0pt%3B%0A%09mso-bidi-font-size%3A10.0pt%3B%7D%0A%40page%20WordSection1%0A%09%7Bsize%3A612.0pt%20792.0pt%3B%0A%09margin%3A70.85pt%2070.85pt%2070.85pt%2070.85pt%3B%0A%09mso-header-margin%3A36.0pt%3B%0A%09mso-footer-margin%3A36.0pt%3B%0A%09mso-paper-source%3A0%3B%7D%0Adiv.WordSection1%0A%09%7Bpage%3AWordSection1%3B%7D%0A%2D%2D%3E--& mp;gt; The student should be able to manipulate algebraic expressions, to compute limits, derivatives and integrals, and to sketch the graph and extract some information of a function by knowing its derivative.
Main themes :	The course presents the Differential and Integral Calculus in one variable, and its mathematical foundations.
Aims :	Contribution du cours aux acquis d'apprentissage du programme de bachelier en mathématique. A la fin de cette activité, l'étudiant aura progressé dans : By the end of the course, the student should have progressed in obtaining the following skills: - Recognise and understand a basic foundation of mathematics. - Choose and use the basic tools of calculation to solve mathematical problems. - Recognise the fundamental concepts of important current mathematical theories. - Establish the main connections between these theories, analyse them and explain them through the use of examples. - Identify, by use of the abstract and experimental approach specific to the exact sciences, the unifying features of different situations and experiments in mathematics or in closely related fields (probability and statistics, physics, computing). - Show evidence of abstract thinking and of a critical spirit. - Recognise the key arguments and the structure of a proof. - Evaluate the rigour of a mathematical or logical argument and identify any possible flaws in it. - Distinguish between the intuition and the validity of a result and the different levels of rigorous understanding of this same result. - Write a mathematical text according to the conventions of the discipline. Acquis d'apprentissage spécifiques au cours. A la fin de cette activité, l'étudiant sera capable de : By the end of the course, the student should be able to : - Recognise the concepts, tools and methods of the Differential and Integral Calculus in one variable: ' by providing rigorous mathematical definitions, ' by stating the main propositions and theorems, ' by proving propositions, theorems and their variants,

	' by illustrating definitions, propositions, and theorems by examples, counter-examples, and applications, ' by comparing concepts among themselves, ' by verifying some property using a definition and different characterisations, ' by adapting proofs presented in the lectures to similar situations. - Compute using the concepts, tools and methods of the Differential and Integral Calculus: ' by computing limits, derivatives and integrals, ' by solving optimisation problems, ' by solving differential equations. *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".*
Evaluation methods :	Learning will be assessed by a compulsory test in the course of the semester and by a final examination. The questions will ask students to: - reproduce the subject matter, especially definitions, theorems, proofs, and examples - select and apply methods from the course to solve problems and exercises - adapt methods of demonstration from the course to new situations -summarise and compare topics and concepts. Assessment will focus on - knowledge, understanding and application of the different mathematical methods and topics from the course - precision of calculations - rigour of arguments, proofs and reasons - quality of construction of answers.
Teaching methods :	Learning activities consist of lectures, exercise sessions and tutorial sessions. The lectures aim to introduce fundamental concepts, to explain them by showing examples and by determining their results, to show their reciprocal connections and their connections with other courses in the programme for the Bachelor in Mathematics. The exercise sessions aim to teach how to select and use calculation methods and how to construct proofs. The tutorial sessions give students individual help and follow up in their learning. The three activities are given in presential sessions.
Content :	real numbers and sequences - continuous functions - integrals - derivatives - Differential and Integral Calculus - differential equations
Bibliography :	& mp;amp;amp;amp;lt;!--{cke_protected}{C}%3C!%2D%2D%0A%20%2F*%20Font%20Definitions%20*%2F%0A%40font-face%0A%09%7Bfont-family%3A%22Cambria%20Math%22%3B%0A%09panose-1%3A2%204%205%203%205%204%206%203%202%204%3B%0A%09mso-font-charset%3A0%3B%0A%09mso-generic-font-family%3Aauto%3B%0A%09mso-font-pitch%3Avariable%3B%0A%09mso-font-signature%3A3%200%200%200%201%200%3B%7D%0A%40font-face%0A%09%7Bfont-family%3A%22%E3%83%92%E3%83%A9%E3%82%AE%E3%83%8E%E8%A7%92%E3%82%B4%20Pro%20W3%22%3B%0A%09mso-font-charset%3A78%3B%0A%09mso-generic-font-family%3Aauto%3B%0A%09mso-font-pitch%3Avariable%3B%0A%09mso-font-signature%3A-536870145%2020059927551%2018%200%20131085%200%3B%7D%0A%20%2F*%20Style%20Definitions%20*%2F%0Ap.MsoNormal%2C%20li.MsoNormal%2C%20div.MsoNormal%0A%09%7Bmso-style-unhide%3Ano%3B%0A%09mso-style-qformat%3Ayes%3B%0A%09mso-style-parent%3A%22%22%3B%0A%09margin%3A0cm%3B%0A%09margin-bottom%3A.0001pt%3B%0A%09mso-pagination%3Awidow-orphan%3B%0A%09font-size%3A12.0pt%3B%0A%09font-family%3A%22Times%20New%20Roman%22%3B%0A%09mso-fareast-font-family%3A%22Times%20New%20Roman%22%3B%0A%09mso-ansi-language%3AEN-US%3B%0A%09mso-fareast-language%3AEN-US%3B%7D%0Ap.CorpsA%2C%20li.CorpsA%2C%20div.CorpsA%0A%09%7Bmso-style-name%3A%22Corps%20A%22%3B%0A%09mso-style-unhide%3Ano%3B%0A%09mso-style-parent%3A%22%22%3B%0A%09margin%3A0cm%3B%0A%09margin-bottom%3A.0001pt%3B%0A%09mso-pagination%3Awidow-orphan%3B%0A%09font-size%3A12.0pt%3B%0A%09mso-bidi-font-size%3A10.0pt%3B%0A%09font-family%3AHelvetica%3B%0A%09mso-fareast-font-family%3A%22%E3%83%92%E3%83%A9%E3%82%AE%E3%83%8E%E8%A7%92%E3%82%B4%20Pro%20W3%22%3B%0A%09mso-bidi-font-family%3A%22Times%20New%20Roman%22%3B%0A%09color%3Ablack%3B%0A%09mso-font-kerning%3A.5pt%3B%0A%09mso-ansi-language%3AFR%3B%7D%0Aspan.LienInternet%0A%09%7Bmso-style-name%3A%22Lien%20Internet%22%3B%0A%09mso-style-update%3Aauto%3B%0A%09mso-style-unhide%3Ano%3B%0A%09mso-style-parent%3A%22%22%3B%0A%09mso-ansi-font-size%3A10.0pt%3B%0A%09color%3A%23000070%3B%0A%09mso-ansi-language%3A%230400%3B%0A%09text-decoration%3Aunderline%3B%0A%09text-underline%3Asingle%3B%7D%0A.MsoChpDefault%0A%09%7Bmso-style-type%3Aexport-only%3B%0A%09mso-default-props%3Ayes%3B%0A%09font-size%3A10.0pt%3B%0A%09mso-ansi-font-size%3A10.0pt%3B%0A%09mso-bidi-font-size%3A10.0pt%3B%7D%0A%40page%20WordSection1%0A%09%7Bsize%3A612.0pt%20792.0pt%3B%0A%09margin%3A70.85pt%2070.85pt%2070.85pt%2070.85pt%3B%0A%09mso-header-margin%3A36.0pt%3B%0A%09mso-footer-margin%3A36.0pt%3B%0A%09mso-paper-source%3A0%3B%7D%0Adiv.WordSection1%0A%09%7Bpage%3AWordSection1%3B%7D%0A%2D%2D%3E--& mp;amp;amp;amp;gt; Lecture notes: printed version available at DUC and on-line version available on the website http://www.duc.be/.
Cycle and year of study :	> Bachelor in Mathematics > Bachelor in Physics
Faculty or entity in charge:	SC