



	<p>' by defining, giving properties and illustrating by examples and counter-examples the convergence of a sequence of vectors, the notions of compact set, continuity, differentiability and integrability of functions of several variables, and by connecting these properties among themselves using theorems and counter-examples,</p> <p>' by explaining and illustrating the connection between different notions of derivatives of functions of several variables,</p> <p>' by stating and illustrating Weierstass's theorem and the mean value theorem,</p> <p>' by stating and graphically illustrating the necessary conditions in optimisation problems (with or without constraints),</p> <p>' by extending proofs in one variable to the setting of several variables.</p> <p>- Solve problems using analytical tools:</p> <p>' by connecting a function of several variables to its graphical representations (graph, level sets, traces),</p> <p>' by verifying the continuity, differentiability or integrability of a function,</p> <p>' by solving optimisation problems in several variables,</p> <p>' by approximating a function of several variables by its Taylor polynomial, and by exploiting such an information to deduce some graphical interpretation,</p> <p>' by computing limits, derivatives and integrals of functions of several variables.</p> <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>
<p><b>Evaluation methods :</b></p>	<p>Learning will be assessed by a final examination. The questions will ask students to:</p> <ul style="list-style-type: none"> <li>- reproduce the subject matter, especially definitions, theorems, proofs, and examples</li> <li>- select and apply methods from the course to solve problems and exercises</li> <li>- adapt methods of demonstration from the course to new situations</li> <li>- summarise and compare topics and concepts.</li> </ul> <p>Assessment will focus on</p> <ul style="list-style-type: none"> <li>- knowledge, understanding and application of the different mathematical methods and topics from the course</li> <li>- precision of calculations</li> <li>- rigour of arguments, proofs and reasons</li> <li>- quality of construction of answers.</li> </ul>
<p><b>Teaching methods :</b></p>	<p>Learning activities consist of lectures, exercise sessions and tutorial sessions.</p> <p>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.</p> <p>The exercise sessions aim to teach how to select and use calculation methods and how to construct proofs.</p> <p>The tutorial sessions give students individual help and attentions in their learning.</p> <p>The three activities are given in presential sessions.</p>
<p><b>Content :</b></p>	<p>&amp; 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%22E3%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%0A%09mso-style-unhide%3A0%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%0A%09CorpsA%2C%20li.CorpsA%2C%20div.CorpsA%0A%09%7Bmso-style-name%3A%22Corps%20A%22%3B%0A%09mso-style-unhide%3A0%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%22E3%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%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--&amp; mp;gt;</p> <p>Differential and Integral Calculus in several variables :</p> <ul style="list-style-type: none"> <li>- vector spaces, sequences, and topology,</li> <li>- continuity,</li> <li>- differentiability,</li> <li>- Taylor expansion,</li> <li>- optimisation problems with and without constraints,</li> <li>- integral calculus.</li> </ul>

<p>Bibliography :</p>	<p>&amp; 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%22E3%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%0A%09mso-normal%2C%20li.MsoNormal%2C%20div.MsoNormal%0A%09%7Bmso-style-unhide%3A%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%0A%09CorpsA%2C%20li.CorpsA%2C%20div.CorpsA%0A%09%7Bmso-style-name%3A%22Corps%20A%22%3B%0A%09mso-style-unhide%3A%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%22E3%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%09span.LienInternet%0A%09%7Bmso-style-name%3A%22Lien%20Internet%22%3B%0A%09mso-style-unhide%3A%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-decoration%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--&amp; mp;gt;</p> <p>Lecture notes: printed version available at DUC and on-line version available on the website <a href="http://www.duc.be/">http://www.duc.be/</a>.</p>
<p>Cycle and year of study :</p>	<p><a href="#">&gt; Bachelor in Mathematics</a>  <a href="#">&gt; Bachelor in Physics</a></p>
<p>Faculty or entity in charge:</p>	<p>SC</p>