



5.00 credits

45.0 h + 22.5 h

Q1

Teacher(s)	Heuchenne Cédric ;
Language :	French
Place of the course	Bruxelles Saint-Louis
Prerequisites	<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>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <ul style="list-style-type: none"> <li>• understand and explain basic and advanced techniques of statistics ;</li> <li>• identify when they can be used ;</li> <li>• solve exercises involving those techniques and interpret the obtained results.</li> </ul>
Evaluation methods	The evaluation is based on a written exam, without access to materials. It consists of both methodological questions and practical applications. Students may use an official (unannotated) formula glossary, statistical tables, and a non-programmable calculator. These tools are not provided by the teacher during the exam.
Teaching methods	<p>a) The course provides a systematic introduction to the theoretical and methodological foundations of mathematical statistics. In addition to intuitive explanations, it emphasizes the formalized manipulations and concepts that allow for an in-depth understanding of the subject. Concrete examples, primarily drawn from the field of economics and other areas relevant to management engineers, are used to illustrate and apply the theory. Throughout the course, a particular effort is made to encourage active participation of the students in the development and discovery of statistical concepts and their applications (including, among other means, videos and exercises preparations). A selection of exercises (continuously updated) is made available to students and may serve as a basis for questions or discussions with the teaching team.</p> <p>This course serves as a gateway to other courses in the curriculum for management engineering students and prepares them for the quantitative methods needed for their projects and final master's theses.</p> <p>b) Active participation in all the learning sessions is highly recommended, as it greatly increases the chances of success. Students must engage in regular personal study (including solving the proposed exercises) from the very first week of the course. As the course progresses, each student should dedicate sufficient personal study time to ensure he/she fully understands the material. By the end of the semester, the period leading up to the exam should not be one of discovery but rather one of reviewing material that has already been understood and mastered. Personal work should not involve rote memorization. What will be assessed during the exam is not the student's ability to rewrite information, but her/his deep understanding of the concepts and explanatory mechanisms, as well as his/her ability to apply them.</p>
Content	<p>This course, as well as the "Probability" course, is based on the following book :</p> <p>W. Mendenhall, D. Wackerly and R. Scheaffer, <i>Mathematical Statistics with Applications</i>, Duxbury Press, 7th edition, 2008.</p> <p>Chapters 7 to 14 constitute the content of the Advanced Statistics course (with possible reviews of the Probability course that precedes it in the curriculum, as well as certain documents/videos introducing recent developments useful for understanding current technologies).</p> <p>This course presents the following chapters:</p> <ul style="list-style-type: none"> <li>- Chapter 7: Sampling and « central-limit » theorem;</li> <li>- Chapter 8: Point and interval estimation: fundamental elements;</li> <li>- Chapter 9: Estimation theory;</li> <li>- Chapter 10: Hypothesis tests;</li> <li>- Chapter 11: Regression model and least squares adjustment (including matrix notation);</li> <li>- Chapter 12: Introduction to experimental plans (comparison of two means: paired or independent samples);</li> <li>- Chapter 13: One-criterion variance analysis;</li> <li>- Chapter 14: Analysis of categorical data (chi-squared tests: goodness-of-fit test and test of independence).</li> </ul>
Inline resources	See the moodle page of the course.

<p>Bibliography</p>	<ul style="list-style-type: none"> <li>- Wackerly D. D., Mendenhall W and R.L. Scheaffer, Mathematical Statistics with Applications, Duxbury Press, 7th ed., 2008.</li> <li>- Mood A.M., Graybill F.A. and D.C. Boes, Introduction to the Theory of Statistics, Mc Graw Hill Ed., 1974. (<a href="http://www.colorado.edu/economics/morey/7818/MoodGraybillBoesBook/MGB3rdSearchable.pdf">http://www.colorado.edu/economics/morey/7818/MoodGraybillBoesBook/MGB3rdSearchable.pdf</a>)</li> <li>- Rohatgi V. K. and A. M. Md. Ehsanes Saleh, Introduction to probability and Statistics, Wiley-Interscience; 2d ed., 2000.</li> <li>- Mendenhall W, Sincich T. and Nancy S. Boudreau, Statistics for Engineering and the Sciences, Pearson Prentice Hall, 6th ed., 2016.</li> <li>- Knight, K. (1999). Mathematical Statistics. ISBN-13: 9781584881780</li> <li>- Casella, G. et Berger, R.L.. (2012). Statistical Inference. ISBN-13: 9780534243128.</li> </ul>
<p>Other infos</p>	<ul style="list-style-type: none"> <li>- The course is mandatory for students in the 'Management Engineering' track.</li> <li>- The course is recommended for students seeking more in-depth training in statistics.</li> <li>- The course is not recommended for students struggling with mathematics.</li> <li>- This course is part of a statistics curriculum focused on management and economics. It is preceded by the 'Probability' course.</li> </ul>
<p>Faculty or entity in charge</p>	<p>ESPB</p>

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor : Business Engineering	<a href="#">INGB1BA</a>	5	<a href="#">BINGE1131</a>	
Bachelor : Business Engineering (French-English)	<a href="#">INAB1BA</a>	5	<a href="#">BINGE1131</a>	
Bachelor : Business Engineering (French-Dutch-English)	<a href="#">INTB1BA</a>	5	<a href="#">BINGE1131</a>	