



4.00 credits	30.0 h + 22.5 h	Q2
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Teacher(s)	Heuchenne Cédric ;Uyttendaele Nathan (compensates Heuchenne Cédric) ;
Language :	French
Place of the course	Bruxelles Saint-Louis
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>a) General Objectives:</p> <ul style="list-style-type: none"> - To introduce the probabilistic mode of reasoning and the methods of mathematical statistics. These methods are useful in all fields of science where random and/or experimental aspects appear (human, technical, medical or natural sciences). The course will especially develop tools useful for management sciences, economics and management. - This course is part of a training program in statistics. It prepares students for the subsequent courses in Advanced Statistics (INGE1231) and Econometrics (ECGE1330). - Because of its formalized nature, this course is not recommended for students with mathematical difficulties. <p>b) Specific objectives:</p> <p>At the end of the probability course, students should be able to :</p> <ul style="list-style-type: none"> - understand and model the randomness of certain phenomena - correctly model simple experiments (drawing from an urn with or without a discount) and calculate the probabilities of the events of interest - apply these basic models to real-life situations (gambling, insurance, calculating the profitability of a stock, etc.); - describe a random experiment using uni- and bi-variate random variables; - use discrete and continuous random variables to calculate probabilities in real problems; - study the properties of functions of random variables.
Evaluation methods	<p>A mock test will be organized in May. It will allow students to identify their strengths and weaknesses in probability. This mock exam will not only familiarize students with an online assessment on Moodle, but will also prepare them for the course assessments in the June and/or August semester. Students who score 12 points or more on the mock exam will be eligible to receive 1 bonus point on their June and/or August exams. No mock exams will be given during the summer before the last session in August.</p> <p>The evaluation will be done in June and August, either face-to-face or online on Moodle; you will be informed very quickly of the choice between a face-to-face exam and a remote exam on Moodle. If the exam is to be held on Moodle, it will be based on integrated questions as in the May mock exam; these integrated questions on Moodle allow for an exam that is as close as possible to the in-person exams. Whether it is organized face-to-face or remotely on Moodle, this type of exam allows us to assess the student's mastery of the technical and computational aspects of the course, his or her rigor in this area, his or her ability to interpret the results obtained and to evaluate his or her reasoning.</p> <p>Such an evaluation questions not only the understanding of the course acquired by the student (understanding its concepts and their applications in exercises and knowing how to interpret the results) but also requires the ability to go a little beyond the material seen in the course and in the practical work, by his own means. In other words, it is a matter of making the effort to appropriate the course material in order to use it.</p> <p>The June and/or August evaluation will in no way be an exact replica of the mock exam. It is not enough to just concentrate on the mock exam and on the practical exercises and hope to discover the same (or almost the same) on the exam; this is totally insufficient.</p> <p>During the evaluations, students will be able to use a form, the statistical tables and their calculator (not alpha-numeric).</p> <p>Whenever possible, this online assessment on Moodle will be done in the computer lab at Saint Louis University with the student's computer. If a student does not have such equipment, they may request it from the University.</p> <p>Remark:</p> <p>This course outline may evolve, as the course progresses, according to the dynamics with the students and from year to year according to the improvements made to the course and the practical exercises.</p>

Teaching methods	<p>Lectures and practical sessions (TPs).</p> <p>INGE1130 : Mathématiques pour ingénieurs de gestion I INGE1132 : Mathématiques pour ingénieurs de gestion II</p> <p>The reference handbook: W. Mendenhall, D. Wackerly and R. Scheaffer, <i>Mathematical Statistics with Applications</i>, Duxbury Press, 7th edition, 2008. The lecture and the practical work (TPs) will be given in person; the lecture and the TPs will also be the subject of video capsules, of document exchange with the detailed solutions of the TPs, of possible Questions/Answers sessions on Teams and of the use of the digital platform Moodle to which the students are obligatorily registered. Communications and instructions for the course and tutorials will be sent to students via announcements on Moodle; each week, videos corresponding to the week's course will be sent via Moodle. Watching the videos of the week before the lecture and before the lab effectively prepares you for the lecture and the lab and allows you to take full advantage of them; that is, watching these videos in advance eliminates the need to cumulate the effort of noting what is said in the lecture and/or the lab with the effort of understanding it.</p> <p>a) The lecture is a systematic introduction to the theoretical and methodological foundations of probability calculus and to its probabilistic reasoning; in addition to intuitive explanations of the subject, the lecture emphasizes the manipulations and formalized concepts that allow a rigorous knowledge of probability calculus. It is accompanied by concrete examples, notably chosen in the field of economics but also in the fields of interest to the management engineer, intended to illustrate and apply the theory. A special effort is made throughout the course to involve students in the development and discovery of concepts useful to statistics and their applications. Active participation in the course should enable students to take full advantage of the practical work that complements the lecture and to be involved in a research process from the outset.</p> <p>At the end of the course, the student should be able to understand and model the randomness of simple experiments and to calculate the probabilities of the resulting events. They should also be able to apply these models to more complex real-world situations and to describe these phenomena using the appropriate random variables (uni- and multivariate). The student will also be required to know the properties of functions of random variables and how their concepts apply directly to the framework of statistical analysis (sampling).</p> <p>This course opens up to various other courses in the management engineering curriculum and prepares students for the quantitative methods needed for their future papers and dissertations. This course is particularly designed to prepare students for the Advanced Statistics (INGE1231) and Econometrics (ECGE1330) courses that will be taken in BLOCK2 and BLOCK3 (resp.) of their undergraduate curriculum.</p> <p>b) The practical work, given by Mrs Véronique Tissot and Mr Jérôme Dollinger, in charge of the practical work (TPs), is based on a collection of exercises which is largely based on the exercises of the reference book (W. M. S.). The assistants who supervise this course will agree on a set of dynamic pedagogical devices in face-to-face and distance learning; videos, Q&A sessions on Teams, solutionnaires for the proposed exercises, etc. These different devices will be organized according to a chronology designed to put students to work from the beginning of the course.</p> <p>c) Active participation in the courses and practical work, and participation in the Q&A sessions are essential; the chances of success depend on it. Regular personal work (in particular, understanding the course and finding the solutions to the exercises proposed) must imperatively be provided by the student, from the first week of the course; it is absolutely essential that the students get into the rhythm of the course, then of the practical exercises, from the beginning of the term.</p> <p>Each student must therefore devote sufficient personal study time to ensure that he/she understands and appropriates the material as he/she goes along, with the help of his/her notes taken during the course, the course videos, the course slides, the reference book (W.M.S.) and the pedagogical devices relating to the practical exercises. At the end of the semester, the period preceding the exam should not be a period of discovery but rather a period of revision of a previously understood and acquired subject.</p> <p>The personal work expected is in no way a memorization by heart. What will be evaluated at the exam is not the student's ability to reproduce but rather his or her in-depth understanding of the concepts and explanatory mechanisms and his or her ability to use them wisely, without forgetting the calculative aspect.</p> <p>Other reference books, available at the University Library or online, are offered to students as a complement for their more or less formalized aspect and/or for their array of solved or unsolved exercises.</p>
Content	<p>The reference handbook: W. Mendenhall, D. Wackerly and R. Scheaffer, <i>Mathematical Statistics with Applications</i>, Duxbury Press, 7th edition, 2008.</p> <ul style="list-style-type: none"> - Introduction to statistics (MWS, Chapter 1); - Probabilities (MWS, Chapter 2); - Discrete random variables (MWS, Chapter 3); - Continuous random variables (MWS, Chapter 4); - Multivariate variables (MWS, Chapter 5); - Functions of random variables (MWS, Chapter 6); - Sampling and "central-limit" theorem (MWS, Chapter 7);
Bibliography	<ul style="list-style-type: none"> - Wackerly D. D., Mendenhall W and R.L. Scheaffer, <i>Mathematical Statistics with Applications</i>, Duxbury Press, 7th ed., 2008 (le livre de référence du cours) - Mood A.M., Graybill F.A. and D.C. Boes, <i>Introduction to the Theory of Statistics</i>, Mc Graw Hill Ed., 1974. (http://www.colorado.edu/economics/morey/7818/MoodGraybillBoesBook/MGB3rdSearchable.pdf) - Rohatgi V. K. and A. M. Md. Ehsanes Saleh, <i>Introduction to probability and Statistics</i>, Wiley-Interscience; 2d ed., 2000. - Ross S., <i>A first course in Probability</i>, Pearson International Edition, 9th ed., 2013. ISBN-10: 1292024925. - Comte M. et J. Gaden, <i>Statistiques et Probabilités pour les sciences économiques et sociales</i>, Collection Mayor, PUF, 1ère édition, 2000.

Other infos	<p>The course is compulsory for the students in Management Engineering.</p> <ul style="list-style-type: none"> - The course is recommended for students looking for an "in depth" training in statistics. - This course is part of a logical progression in statistical training. It is followed by the "In depth statistics » and econometrics" course in BLOC 2 and BLOC 3, resp. - The course is to be avoided by students experiencing difficulties in mathematics.
Faculty or entity in charge	ESPB

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor : Business Engineering	INGB1BA	4		
Bachelor : Business Engineering (French-English)	INAB1BA	4		
Bachelor : Business Engineering (French-Dutch-English)	INTB1BA	4		