UCLouvain

lecge1114
2022

Statistics in Economics and Management I

5.00 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Jacquemain Alexandre (compensates Kestemont Marie-Paule) ;Kestemont Marie-Paule ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	1: Descriptive Statistics. Descriptive Statistics is the umbrella term for those methods which make it possible to condense the data from a sample or a population down into a small number of useful characteristics or estimates. The samples deal with frequency distributions, density and distribution functions and parametric and non parametric characteristics. The description of double-entry tables makes it possible to describe samples where two characteristics are analysed simultaneously. 2: Introduction to Probability Theory. It is the method of selecting a sample which ensures that there is a link between the population and its sample. The topics covered in this part of the course deal with the rules of probability theory (conditional, total, Bayes formula, etc.), the quantification of events in univariate random variables and the associated distribution of probabilities, for finite sets. Enumerations resulting from experimental plans generating uniform, discreet, binomial and hyper-geometric laws are studied in detail. 3: Introduction to Statistical Inferencing. When observations are used to challenge hypotheses on population parameters, statistical inferencing uses estimators. This part of the course analyses these statistical estimators, their characteristics and their inferencing qualities. 4: Random variables. This part of the course extends the concept of discreet random variable to include the case of countable but infinite sets (geometric laws and Poisson's law) and their link to the binomial process. These concepts are then extended to uncountable sets (continuous random variables and probability density). The calculations related to laws of uniform continuous, exponential and normal distribution are also studied in more detail. 5: Multivariate random variables The object here is to show how one can analyse experiments where the characteristics of interest are modelled by several random variables. The links which can exist between these variables are often the object of the analysis. The basic ideas are introduced by means of bivariate discreet variables -continuous variables will only be mentioned in passing. The properties of linear combinations of random variables are also discussed. 6: Sampling This part of the course explains how statistical inferencing can be carried out on the basis of random sampling. The statistical model provides the framework for the analysis and sampling distributions establish the link between sample and population. These concepts are illustrated through average and proportional sampling distributions. In the case of large samples, the Central-Limit theorem is naturally applicable.
Learning outcomes	**At the end of this learning unit, the student is able to :**
	1 This course is an introduction to statistics and to the probability theory. Students should be able to describe and analyse a sample, to identify basic sampling procedures, to determine the characteristics of basic statistics (average, deviation, proportion) at work in these procedures and to specify the features which make it possible to make inferences about population parameters. Probability theory is a branch of Mathematics which makes it possible to describe and understand random experiments. It is therefore an essential tool for measuring and checking the uncertainties inherent in statistical reasoning. This course goes into more detail on the basic topics covered in the Descriptive Statistics course, which was limited to the study of finite sets and to provide the tools specifically for those experiments where the possible results are countable but infinite or uncountable (continuous).
Evaluation methods	Final written exam (paper or computer format) : MCQ and/or numerical questions (with short answers) and/or open-ended questions during the exam session. These final exam methods are identical in the June and September sessions.
Teaching methods	The course is given in the form of lectures (presentation of concepts, examples of applications, problem solving) and exercise sessions in small groups (exercise resolutions), supplemented by an active participation of the students in the form of readings, viewing videos, preparing exercises and carrying out knowledge tests.
	The Moodle course LECGE1114 is the reference site. Students are invited to consult it regularly.
	Specific communication and exchange channels between students and the teaching team have been set up (Moodle Forum, Teams channels, Teams meetings, etc.).
	This teaching is designed to adapt quickly to health developments (face-to-face, co-modal or distance teaching). Students are encouraged to regularly check their class schedule on ADE as well as the information available on Moodle.
Content	This lecture is an introduction to statistics. The statistics is the science which allows to confront data samples (observing or experimenting a subset of population) with theory (statements and tests of hypotheses on population characteristics). It is the science of data analysis that applies widely to economics, political and social sciences.
	The lecture articulates around descriptive statistics, probability theory and statistical inference (introduction).

Inline resources	MOODLEUCL : lecture LECGE1114.
Bibliography	*Mathematical Statistics with Applications,* Wackerly, Mendenhall, Scheaffer, 7ème édition.
Faculty or entity in charge	ESPO

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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Minor in Management (ESPO students)	MINAGEST	5		🔍
Minor in Economics (open)	MINOECO	5		🔍
Master [120] in Environmental Science and Management	ENVI2M	5		🔍
Bachelor in Philosophy, Politics and Economics	PPE1BA	5		🔍
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	5		🔍
Minor in Mangement (basic knowledge)	MINOGEST	5		🔍
Bachelor in Economics and Management	ECGE1BA	5		🔍
Mineure en statistique et science des données	MINDATA	5		🔍