

## Faculty of Economic, Social and Political Sciences



### INGE1214 Further Statistics

[30h+15h exercises] 4 credits

**Teacher(s):** Isabelle De Macq (supplée Michel Denuit), Michel Denuit, Christian Hafner  
**Language:** French  
**Level:** First cycle

#### Aims

The aim of this course is to introduce the types of reasoning and basic methods used in statistical analysis, and examine how they are applied to solve simple statistical problems in the field of Economics and Management. This course also aims to teach the core subject-matter developed in the Statistics and Econometrics courses which students will take later in their degree course.

By the end of the course students should be able to understand basic mechanisms of statistical inferencing and provide practical solutions to standard problems of estimation, confidence interval construction and hypothesis testing. Concepts are introduced through simple examples (averages, variances and proportions) but students are also presented with instruments and models used to tackle more general problems such as general estimation techniques and hypothesis testing resolution. They should also be able to deal with classic statistical problems such as modelling inter-variable relations, comparisons of averages and adjustment tests. .

#### Main themes

Part 1: Methods of statistical analysis.

After an introduction to statistical models (population and sampling models), students are shown how statistic sampling distributions form the basis for inferencing. These properties make it possible to check the precision of specific estimators, to construct confidence intervals and to check the risks of error in a hypothesis testing procedure. This involves the development of a general theory of estimation (the properties of the estimator, including properties in large samples) and a general theory of hypothesis testing.

Part 2: Application to some standard problems.

In this part, the methods taught in Part 1 are adapted to analyzing useful application issues in Economics and Management: inter-variable relation modelling (linear models);

Introduction to experiment plans (comparison of two averages, independent or paired samples), variance analysis (comparison of several averages); studies of categorical data including inter-variable independence tests

#### Content and teaching methods

Contents:

Statistical model and sampling distribution, point and interval estimation (simple problems and general theory, including asymptotic properties), hypothesis testing (simple problems and general theory), multiple linear models, variance analysis, categorical variables (multinomial adjustment tests and contingency tables).

Method: The course comprises:

- lectures (the teacher introduces the concepts through a particular concrete application and abstracts from that),
- practical exercise sessions (the teacher gives students applications/problems and suggests ways of solving them). Active student participation through reading and independent problem solving

**Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)**

Course materials: References: (for information only) : Wackerly, D., Mendenhal, W. and R. Scheaffer (2002), Mathematical Statistics with Applications, Duxbury Press, New York, 6th edition (chapitres 7 to 14))

**Other credits in programs**

<b>ACTU21MS</b>	Première année du master en sciences actuarielles, à finalité spécialisée	(4 credits)	Mandatory
<b>INGE12BA</b>	Deuxième année de bachelier en ingénieur de gestion	(4 credits)	Mandatory