Course Descriptions Bachelor 2023-2024

Course Title	Mathematical Statistics
Course Code	EBC2107
ECTS Credits	6,5
Assessment	Whole/Half Grades

Period

Period	Start	End	Mon	Tue	Wed	Thu	Fri
4	5-2-2024	28-3-2024	L	X		X	

Level	Intermediate/Advanced
Coordinator	Stephan Smeekes For more information:s.smeekes@maastrichtuniversity.nl
Language of instruction	English
Goals	Understanding of statistical principles: population models and sampling processes; sampling theory in small samples and in large samples. Understanding of main methods of statistical inference: point estimation, hypothesis testing, interval estimation. Working knowledge of linear regression models and bootstrap methods. Some applications of statistical models and methods to practical problem solving.
Description	Mathematical Statistics is a sequel to the first-year Probability Theory course. Here we utilise the formal tools of probability distributions to introduce you to the principles of statistical inference. Whereas probability theory can be seen as a branch of deductive mathematics, statistical inference proceeds by inductive reasoning. What this means, in a nutshell, is that general conclusions about entire populations (the "real world") are based on relatively small samples extracted from it (the "data"). It is impossible to make such generalisations without some risk of being wrong. Indeed, much of the 'mathematical' content of statistics serves precisely to evaluate and control that risk. The subject matter covered in the course includes random samples and sampling distributions, methods of point estimation, interval estimation and hypothesis testing, the evaluation of these methods in small and large samples, and some applications, with an emphasis on simple linear regression and the bootstrap.
Literature	Casella G. & R.L. Berger, Statistical Inference, 2nd edition, Duxbury Press, Thomson Learning, 2002. ISBN 0-534-24312-6. Chapters 6-11, the first five chapters of this same textbook were covered in the preceding Probability Theory course. Additionally, lecture notes on the bootstrap (distributed via the course website).
Prerequisites	Algebra, calculus, mathematical analysis, set theory, and probability theory. ATTENTION: This course is NOT introductory. It requires not only deep mathematical knowledge but also familiarity with abstract mathematical reasoning. The material studied in this course relies very heavily on the material from Chapters 1 through 5 of Casella & Berger (2002). A thorough prior knowledge of probability theory on the level of Chapters 1 through 5 of Casella & Berger (2002) is therefore required for this course. Basic knowledge of probability theory through an introductory course is not sufficient. These chapters are assumed to have been studied BEFORE the course and are therefore not discussed during the course! It will be pretty much impossible to make up for a lack of this knowledge during the course. EXCHANGE STUDENTS: Exchange students are welcome to take the course but should realise that their background may not be sufficient. If you study a standard economics or business programme, it is NOT advised to take this course.
Teaching methods	Presentation / Lecture / Assignment / Groupwork
Assessment methods	Final Paper / Participation / Written Exam
Evaluation in previous academic year	For the complete evaluation of this course please click http://iwio-sbe.maastrichtuniversity.nl/rapporten.asp?referrer=codeUM

This course belongs to the following programme / specialisation

Bachelor Business Analytics	Year 3 Elective Course(s)
Bachelor Econometrics and Operations Research	Year 2 Compulsory Course(s)
SBE Exchange Bachelor	Bachelor Exchange Courses
SBE Exchange Master	Bachelor Exchange Courses
SBE Non Degree Courses	Bachelor Courses