



3.00 credits

15.0 h

Q1

**This biannual learning is being organized in 2021-2022**

Teacher(s)	Segers Johan ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Basic univariate and multivariate statistics. Working knowledge of the R language for statistical computing.
Main themes	The course focuses on copulas and their use in modelling dependence between random variables. Both theoretical and practical aspects will be covered.
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>By the end of the course, the student will have a working knowledge on copula models and their use in modelling dependence between random variables. He will be able to select,</p> <p>1 calibrate, and validate a copula model and use the fitted model to answer questions related to multivariate data: calculation of risk measures, prediction, decision making.</p>
Evaluation methods	<p>Intermediate tests (8/20)</p> <p>There will be two tests, the first one on chapter 1 and the second one on chapter 2. The tests will take place during the lectures. The tests are compulsory. Each test will count for 4 points of the final grade, so 8 points out of 20 (40%) in total. The questions will concern the exercises of type 'M' (calculations related to particular models) in the lecture notes. The tests are closed-book.</p> <p>Project and oral exam (12/20)</p> <p>The material of chapter 3 will be examined via a project assignment. Students will be required to analyze aspects of dependence in a dataset using techniques covered in the course. They describe the analysis and its results in a short text. Specific instructions will be communicated at the start of chapter 3. This text and any supplementary files are to be submitted via MoodleUCL by the start of the exam period.</p> <p>The oral examination will center around the project submitted by the student.</p>
Teaching methods	During the lectures, the teacher motivates and introduces the main concepts. The students then work independently or in groups to solve the questions in the text. In the meantime, the teacher interacts with the students personally helping them advance at their own pace.
Content	<p>1 Fundamentals : Cumulative distribution functions, Sklar's theorem, various copula properties, densities and conditional distributions, Measures of association</p> <p>2 Models: Archimedean copulas, extreme-value copulas, elliptical copulas</p> <p>3 Inference: Nonparametric inference via the empirical copula, parametric inference via measures of association and likelihood-based parametric inference</p> <p>The course provides a mixture of theory, parametric models, and implementation in R.</p>
Inline resources	The course text is available on the MoodleUCL course page.
Bibliography	<p>Teaching material</p> <ul style="list-style-type: none"> <li>• Syllabus "LSTAT2410 - Copulas: models and inference" (J. Segers)</li> </ul>
Faculty or entity in charge	LSBA

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Statistics: General	<a href="#">STAT2M</a>	3		
Master [120] in Statistics: Biostatistics	<a href="#">BSTA2M</a>	3		
Certificat d'université : Statistique et sciences des données (15/30 crédits)	<a href="#">STAT2FC</a>	3		