UCLouvain	lstat2410 2021	Copulas: models and inference

3.00 crédits	15.0 h	Q1

Cette unité d'enseignement bisannuelle est dispensée en 2021-2022

Enseignants	Segers Johan ;
Langue d'enseignement	Anglais
Lieu du cours	Louvain-la-Neuve
Préalables	Basic univariate and multivariate statistics. Working knowledge of the R language for statistical computing.
Thèmes abordés	The course focuses on copulas and their use in modelling dependence between random variables. Both theoretical and practical aspects will be covered.
Acquis d'apprentissage	**A la fin de cette unité d'enseignement, l'étudiant est capable de :**
	1 A. Eu égard au référentiel AA du programme de master en statistique, orientation générale, cette activité contribue au développement et à l'acquisition des AA suivants, de manière prioritaire : 1.1, 1.3, 2.2, 3.3 Eu égard au référentiel AA du programme de master en statistique, orientation biostatistique, cette activité contribue au développement et à l'acquisition des AA suivants, de manière prioritaire : 1.1, 1.3, 2.2, 3.3. B. 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, 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.
Modes d'évaluation des acquis des étudiants	Intermediate tests (8/20) 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. Project and oral exam (12/20) 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. The oral examination will center around the project submitted by the student.
Méthodes d'enseignement	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.
Contenu	1 Fundamentals : Cumulative distribution functions, Sklar's theorem, various copula properties, densities and conditional distributions, Measures of association 2 Models: Archimedean copulas, extreme-value copulas, elliptical copulas 3 Inference: Nonparametric inference via the empirical copula, parametric inference via measures of association and likelihood-based parametric inference The course provides a mixture of theory, parametric models, and implementation in R.
Ressources en ligne	The course text is available on the MoodleUCL course page.
Bibliographie	Teaching material • Syllabus "LSTAT2410 - Copulas: models and inference" (J. Segers)
Faculté ou entité en charge:	LSBA

Programmes / formations proposant cette unité d'enseignement (UE)

Intitulé du programme	Sigle	Crédits	Prérequis	Acquis d'apprentissage
Master [120] en statistique, orientation générale	STAT2M	3		🔍
Master [120] en statistique, orientation biostatistiques	BSTA2M	3		🔍
Certificat d'université : Statistique et sciences des données (15/30 crédits)	STAT2FC	3		🔍