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| 3.0 credits | 15.0 h | 1q |
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| Teacher(s) :                 | Segers Johan ;   |
| Language :                   | Anglais  |
| 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.  |
| Aims :                       | 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.<br><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i> |
| Content :                    | --<br>Copulas: definitions and general properties<br>--<br>Dependence measures<br>--<br>Elementary copula models: Archimedean, Elliptical, Extreme-value<br>--<br>Advanced copula models: Factor copulas, vine copulas, copulas within other statistical models<br>--<br>Monte Carlo simulation<br>--<br>Inference in parametric and semiparametric models: estimation, testing, model selection<br>--<br>Implementation of methods in R and application to actual data analysis   |
| Bibliography :               | --<br>Joe, H. (2014) 'Dependence modelling with copulas', Chapman and Hall/CRC.<br>--<br>Mai, J.-F. and Scherer, M. (2012) 'Simulating copulas', World Scientific.<br>--<br>McNeil, A. J., Frey, R. and Embrechts, P. (2015) 'Quantitative Risk Management: Concepts, Techniques and Tools', Princeton University Press.   |
| Other infos :                | Hand-outs of the slides will be made available to the students.  |
| Faculty or entity in charge: | LSBA   |

| <b>Programmes / formations proposant cette unité d'enseignement (UE)</b> |         |         |           |   |
|--|---------|---------|-----------|---|
| Intitulé du programme  | Sigle   | Credits | Prerequis | Acquis d'apprentissage  |
| Master [120] in Statistics:<br>Biostatistics                             | BSTA2M  | 3       | -         |  |
| Master [120] in Statistics:<br>General                                   | STAT2M  | 3       | -         |  |
|  | STAT2FC | 3       | -         |  |