UCLouvain

llsmf2904

2023

Managing Complexity

5.00 credits	22.5 h + 15.0 h	Q2

Teacher(s)	Coeurderoy Régis ;Iania Leonardo ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	The material covered in the courses of bachelor in Business Engineering. In particular, students are assumed to be familiar with basic concepts of statistics and econometrics, financial accounting, managerial accounting, and mathematics for business. Knowledge of statistical and econometrics programming languages such as R-studio, and/or Matlab, etc, is assumed.
Main themes	We live in a complex environment, where the interconnections among economic agents (firms, consumers, ect.), their choices/decisions under uncertainty and as a response to unforeseen events determine the successfulness of firms' activities. The last global economic crisis driven by the Covid-19 pandemic, the great financial crisis, the digital transformation, and the pressing need for a transition towards a greener economy, are just some examples how complex and uncertain the firms' competitive arena can be. In this course, students will learn basic tools that companies can use to identify, report and analyze the risks/opportunities that a complex environment can bring to firms' activities.
Learning outcomes	**At the end of this learning unit, the student is able to :** ***Upon completion of this course, students will:*** • Be able to understand and critically assess the risks an organization is exposed to; • Critically assess the reporting of risk in corporations and associated strategic reporting practices; • Analyze the risks a corporation is exposed to; • Apply empirical work in a (relatively) new software (R, Python, etc.).
Evaluation methods	The evaluation methods are based on "Continuous Evaluation", i.e. no exam is foreseen at the end of the teaching session. Students will work in groups on (i) exercises and (ii) concrete, real-life case studies, for which they will deliver a written report and an oral presentation. Individual evaluation will also be part of the final grade.
Teaching methods	The course will be centered around the following teaching methods: • In-class lectures • Practical sessions • Regular meetings with the professors and assistants • Case studies • Guest lecture Prior to the participation to those activities, students will be provided with learning material and compulsory readings that will be pivotal for the understanding of the teaching activities.
Content	**1 What is risk management?** 1.1 Introduction 1.2 Identifying and documenting risk 1.3 Fallacies and traps in risk management 1.4 Why safety is different 1.5 The Basel framework 1.6 Hold or hedge? 1.7 Learning from a disaster 13 **2 The structure of risk** 2.1 Introduction to probability and risk 2.2 The structure of risk 2.3 Portfolios and diversification 2.4 The impact of correlation 2.5 Using copulas to model multivariate distributions 49 **3 Measuring risk** 3.1 How can we measure risk? 3.2 Value at risk 3.3 Combining and comparing risks 3.4 VaR in practice

	3.5 Criticisms of VaR 3.6 Beyond value at risk 82 **4 Understanding the tails** 4.1 Heavy-tailed distributions 4.2 Limiting distributions for the maximum 4.3 Excess distributions 4.4 Estimation using extreme value theory 115 **5 Making decisions under uncertainty** 5.1 Decisions, states and outcomes 5.2 Expected Utility Theory 5.3 Stochastic dominance and risk profiles 5.4 Risk decisions for managers 156 **6 Understanding risk behavior** 6.1 Why decision theory fails 6.2 Prospect Theory 6.3 Cumulative Prospect Theory 6.4 Decisions with ambiguity 6.5 How managers treat risk **7 Stochastic optimization** 7.1 Introduction to stochastic optimization 7.2 Choosing scenarios 7.3 Multistage stochastic optimization 7.4 Value at risk constraints 224 **8 Robust optimization** 8.1 True uncertainty: Beyond probabilities 8.2 Avoiding disaster when there is uncertainty 8.3 Robust optimization and the minimax approach 250 **9 Real options** 9.1 Introduction to real options 9.2 Calculating values with real options 9.3 Combining real options and net present value 9.4 The connection with financial options 9.5 Using Monte Carlo simulation to value real options 9.6 Some potential problems with the use of real options 285 **10 Credit risk 291** 10.1 Introduction to credit risk 10.2 Using credit scores for credit risk 10.3 Consumer credit 10.4 Logistic regression
Bibliography	Business Risk Management: Models and Analysis by Edward J. Anderson
Faculty or entity in charge	CLSM

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] : Business Engineering	INGE2M	5		🔍