



## ACTU2M - Introduction

### Introduction

---

## ACTU2M - Teaching profile

### Learning outcomes

Graduates of the master's degree in actuarial sciences will be able to design and implement, using a scientific and multidisciplinary approach, processes for managing the financial impact of risks (Quantitative Risk Management) faced by economic agents.

During his training, the future graduate of the master's degree in actuarial sciences will acquire solid methodological foundations but also know-how thanks to tutorials, practical case studies and an obligatory internship in a company or in a research laboratory.

The future graduate of the master's degree in actuarial sciences will thus acquire the knowledge and skills necessary to become:

- a high-level professional capable of analyzing the financial consequences of risks weighing on an economic agent (Enterprise Risk Management) and providing operational solutions;
- a scientist capable of understanding and modeling complex financial systems and their multiple interactions;
- a specialist combining cutting-edge techniques from actuarial sciences and financial mathematics with various related disciplines, such as law, economics, accounting and taxation in order to analyze quantitative risk management problems in all their dimensions;
- an independent expert, understanding all the ethical, economic and social issues of the problems to be resolved and capable of communicating effectively with the various stakeholders;
- a specialist in data sciences applied to insurance.

On successful completion of this programme, each student is able to :

1. Exploiter de manière intégrée un corpus de savoirs en sciences actuarielles, en data science et en mathématiques financières pour agir avec expertise dans le domaine de la gestion quantitative des risques.

1.1

Maîtriser les développements fondamentaux en mathématiques actuarielles et financières.

1.2

Analyser et résoudre des problèmes et des situations pluridisciplinaires concrets et complexes de gestion de l'impact financier des risques selon une approche scientifique en tenant compte de leurs interactions dans une approche dynamique.

1.3

Utiliser les outils fondamentaux de calcul et de programmation dans la résolution de problèmes de gestion de l'impact financier des risques.

1.4

Gérer les risques souscrits par les entreprises d'assurance et de réassurance et déterminer le montant des provisions techniques ainsi que la politique de leur placement.

1.5

Tarifier les principaux instruments financiers (actions, obligations, produits dérivés et structurés) et développer des stratégies financières de couverture adaptées à l'appétit pour le risque de l'investisseur.

1.6

Identifier et proposer une politique optimale de gestion des risques (quantitative risk management et enterprise risk management) pesant sur un agent économique - individu, collectivité ou entreprise.

1.7

Faire preuve d'esprit critique vis-à-vis d'une solution technique en intégrant les enjeux sociaux et la dimension éthique d'un projet.

1.8

Appliquer les normes et réglementations en vigueur dans la discipline.

2.

Mobiliser des savoirs multiples, dans le domaine des sciences actuarielles et des mathématiques financières ainsi que dans les disciplines connexes, en vue d'analyser des problèmes complexes de gestion quantitative des risques et en concevoir des solutions innovantes dans une démarche scientifique rigoureuse.

2.1

Apporter un regard critique, constructif et novateur sur les savoirs et pratiques en matière de gestion de l'impact des risques financiers et assurantiels pesant sur les agents économiques - individus, collectivités ou entreprises - en faisant preuve d'indépendance intellectuelle dans le raisonnement.

2.2

Conseiller, décider et agir en intégrant des valeurs éthiques et d'intégrité, en prenant en considération les conséquences économiques et sociales de ses conseils, décisions et actes pour les différentes parties prenantes.

## 2.3

Maîtriser un socle de savoirs en sciences actuarielles et en finance mathématique lui permettant d'appréhender et de résoudre les problèmes actuels tout en développant de manière autonome les nouvelles connaissances nécessaires pour rester compétent tout au long de sa vie professionnelle.

## 2.4

Articuler des savoirs des différentes disciplines connexes (calcul des probabilités, statistique, droit, économie, comptabilité, fiscalité, etc.) afin de concevoir, individuellement et en équipe, des procédés de gestion de l'impact financier des risques, de les réaliser et de les communiquer aux parties prenantes.

## 2.5

Comprendre les enjeux de l'intégration des marchés, de la mondialisation et du développement durable, ainsi que le rôle joué par les experts universitaires dans ce cadre.

## 3.

Contribuer, en équipe, à la réalisation d'un projet en tenant compte des objectifs poursuivis, des ressources allouées et des contraintes qui le caractérisent, et en communiquer les résultats de manière claire, précise et rigoureuse.

## 3.1

Fonctionner dans un cadre pluridisciplinaire, collaborant avec des collègues d'autres formations avec différents points de vue.

## 3.2

Exprimer un message de façon claire et structurée, tant à l'oral qu'à l'écrit, en s'adaptant au public visé et en respectant les standards de communication propres au domaine.

## 3.3

Interagir et dialoguer efficacement avec des interlocuteurs variés, notamment les associations de consommateurs et les pouvoirs publics.

## Programme structure

---

The master's program is structured as follows:

A possible upgrade based on the learner's previous training.

A core curriculum covering the specific aspects of actuarial science, including the financial valuation of actuarial liabilities and the actuarial mathematics of life, property and liability insurance. These courses are organised into two blocks, one devoted to the mathematical elements of insurance and the other to data science techniques applied to insurance.

A professional focus covering insurance mathematics, financial analysis of insurance commitments, asset liability management (ALM), quantitative risk management (QRM) and enterprise risk management (ERM), as well as cross-disciplinary courses on the annual accounts of insurance companies and the solvency of financial institutions.

The curriculum is completed by a master thesis coupled with an internship in a company or within a university research team.

Optional courses: a wide range of elective courses allowing each student to delve deeper into various subjects linked to the desired professional orientation, ranging from additional mathematics to insurance law. Students also have the option of taking advanced courses at one of the other two universities training future actuaries in Belgium (KU Leuven and ULB).. The courses concerned will most often be taught in English (as indicated by their title).

Students establish a 120-credit program including a compulsory common core (69 credits), a specialized focus (30 credits) and elective courses (21 credits). The common core includes compulsory courses, additional courses set by the Jury according to the diploma giving access to the master's degree in actuarial sciences, and a dissertation coupled with an internship in a company or within a research laboratory. The specialized focus includes advanced courses in actuarial sciences and related disciplines. Elective courses will be selected based on the student's professional goals.

## Detailed programme by subject

---

---

**PROFESSIONAL FOCUS [30.0]**

---

- Mandatory
- ✂ Optional
- △ Not offered in 2024-2025
- ◌ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

---

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Year

1 2

**o Content:**

---

○ LACTU2210	Quantitative Risk Management	Christian Hafner	EN [q2] [30h] [5 Credits]
-------------	------------------------------	------------------	---------------------------

Year

				1	2
LDATS2360	Seminar in data management: basic	Céline Bugli	EN [q1] [15h+10h] [4 Credits]	x	x
LINFO2275	Data mining & decision making	Marco Saerens	EN [q2] [30h+15h] [5 Credits] > French-friendly	x	x

### ⊗ Mathématiques de la finance

LMAT2470	Processus stochastiques (statistique)	Donatien Hainaut	EN [q2] [30h] [5 Credits] > English-friendly	x	x
LSTAT2170	Times series	Rainer von Sachs	EN [q2] [30h+7.5h] [5 Credits]	x	x

### ⊗ Finance

LLSMS2138	Big data in finance	Nathan Lassance	EN [q2] [30h] [5 Credits]	x	x
LLSMS2226	Credit and interest rate risk	Frédéric Vrins	EN [q2] [30h] [5 Credits]	x	x

### ⊗ Droit des assurances

LDROP2021	Insurance Law	Bernard Dubuisson	EN [q2] [30h] [5 Credits]	x	x
-----------	---------------	-------------------	---------------------------	---	---

**OPTIONAL COURSES**

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

These credits are not counted within the 120 required credits.

Year  
1 2

○ **Content:**

⊗ LSST1001	IngénieuxSud	Stéphanie Merle Jean-Pierre Raskin	(FR) [q1+q2] [15h+45h] [5 Credits] 🌐	x	x
⊗ LSST1002M	Information and critical thinking - MOOC	Myriam De Kesel	(FR) [q2] [30h+15h] [3 Credits] 🌐	x	x

**Supplementary classes**

**To access this Master, students must have a good command of certain subjects. If this is not the case, in the first annual block of their Masters programme, students must take supplementary classes chosen by the faculty to satisfy course prerequisites.**

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

⊗ **Cours de langue**

⊗ LANGL1330	English intermediate level - 1st part	
-------------	---------------------------------------	--





## Course prerequisites

---

The **table** below lists the activities (course units, or CUs) for which there are one or more prerequisites within the programme, i.e. the programme CU for which the learning outcomes must be certified and the corresponding credits awarded by the jury before registering for that CU.

These activities are also identified **in the detailed programme**: their title is followed by a yellow square.

### Prerequisites and student's annual programme

As the prerequisite is for CU registration purposes only, there are no prerequisites within a programme year. Prerequisites are defined between CUs of different years and therefore influence the order in which the student will be able to register for the programme's CUs.

In addition, when the jury validates a student's individual programme at the beginning of the year, it ensures its coherence, meaning that it may:

- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.
- transform a prerequisite into a corequisite if the student is in the final year of a degree course.

For more information, please consult the [Academic Regulations and Procedures](#).

---

### # Prerequisites list

**LACTU2900** "Mémoire recherche" has prerequisite(s) LACTU2010 ET LACTU2030 ET LACTU2230 ET LACTU2170

- LACTU2010

## ACTU2M - Information

### Access Requirements

---

*Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the higher education landscape and the academic organisation of courses.*

*General and specific admission requirements for this programme must be satisfied at the time of enrolling at the university.*

*Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed in this table or on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.*

***In the event of the divergence between the different linguistic setting at the university.***

**Others Bachelors of the French speaking Community of Belgium**

Access based on application : access may be granted either directly or on the condition of completing additional courses of a maximum of 60 ECTS credits, or refused.

Foreign students who have completed a university education (minimum 3 years) with strong quantitative connotation and who have obtained at least 70% (or 14/20) of average for all successful university years in their home university, without the slightest failure in mathematics courses, calculation of probabilities and statistics, have the possibility to apply for admission to the program of the Master in Actuarial Science (120 ECTS).

Moreover students who wish to be admitted on the basis of a dossier are invited to consult the [criteria for the evaluation of application](#).

## **Admission and Enrolment Procedures for general registration**

Students must draw up their individual programmes and submits it to the Jury who is responsible for accrediting prior learning and experience.

## Specific professional rules

---

Graduates of UCLouvain's ACTU2M program have direct access to the Belgian professional association (Institut des Actuairens en Belgique - IABE,

Entity

Structure entity

Denomination

Faculty

Sector

Acronym

Postal address

SST/SC/LSBA

(LSBA)

Faculty of Science (SC)

Sciences and Technology (SST)

LSBA

