

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In FrenchDissertation/Graduation Project : **YES** - Internship : **optional**Activities in English: **YES** - Activities in other languages : **NO**Activities on other sites : **YES**Main study domain : **Sciences**Organized by: **Faculty of Science (SC)**Programme acronym: **ACTU2M** - Francophone Certification Framework: 7**Table of contents**

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ACTU2M - Introduction

Introduction

ACTU2M - Teaching profile

Learning outcomes

This Master programme offers students specialized courses in actuarial science for becoming a qualified actuary, starting a career in the financial sector (banking, insurance, pension funds, brokerage, auditing and so on).

Although actuarial science is now a specific discipline with its own area of knowledge, modern actuarial training needs to develop multidisciplinary skills in probability, statistics, law, accounting, economics and finance. The Master programme reflects this by combining specific actuarial and insurance courses with related disciplines. This multidisciplinary approach, which brings together exact sciences and human sciences, is a key feature of the programme.

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

1.

Exploiter de manière intégrée un corpus de savoirs en sciences actuarielles 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 et de la mondialisation, 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 (économistes, juristes, etc.), 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

Students must follow a programme of 120 credits comprising compulsory core subjects (69 credits), a specialized focus (30 credits) and elective courses (21 credits). The core subjects includes compulsory subjects, additional subjects determined by the Jury according to the degree held by the applicant, and a master thesis with or without an internship (15 credits). The specialized focus consists in advanced courses of actuarial science and related disciplines.

Thanks to an active collaboration between KULeuven, ULB and UCLouvain actuarial master programmes, UCLouvain students attend advanced classes in KULeuven or ULB, and vice-versa. The courses shared by the three universities are taught in English, the rest of the UCLouvain programme being taught in French.

A maximum of 50 credits may be accredited to students who already have a second cycle degree or who are working professionally and who have a good foundation and/or professional experience in actuarial science.

For a programme-type, and regardless of the focus, options/or elective courses selected, this master will carry a minimum of 120 credits divided over two annual units, corresponding to 60 credits each.

[> Tronc commun](#) [en-prog-2020-actu2m-tronc_commun]

Liste au choix de finalités ACTU2M

[> Professional Focus](#) [en-prog-2020-actu2m-lactu200s]

[> List of electives](#) [en-prog-2020-actu2m-options]

[> Cours au choix](#) [en-prog-2020-actu2m-lactu200o]

[> Optional courses](#) [en-prog-2020-actu2m-lsc100o]

Preparatory Module (only for students who qualify for the course via complementary coursework)

[> Master \[120\] in Actuarial Science](#) [en-prog-2020-actu2m-module_complementaire]

ACTU2M Detailed programme

Programme by subject

CORE COURSES [69.0]

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

Year

1 2

o Mémoire au choix (15 credits)

⊗ LACTU2900	Master thesis : research ■			15 Credits	q1 or q2	x
⊗ LACTU2910	Master Thesis : Project ■			15 Credits	q1 or q2	x

o Data science (10 credits)

○ LACTU2110	Modélisation prédictive et apprentissage statistique en assurance	Michel Denuit	45h	7 Credits	q2	x
○ LDATS2310	Data science for insurance and finance ■	Donatien Hainaut	15h	3 Credits	q1	x

o Mathématiques de l'assurance (22 credits)

○ LACTU2010	NON LIFE INSURANCE	Michel Denuit	45h	7 Credits	q1	x
○ LACTU2030	LIFE INSURANCE	Donatien Hainaut	45h	7 Credits	q1	x
○ LACTU2040	PENSION FUNDING	Pierre Devolder	30h+15h	5 Credits	q2	x
○ LACTU2280	Reinsurance and Alternative Risk Transfers ■	Jean-François Walhin	15h	3 Credits	q1	x

o Mathématiques de la finance (17 credits)

○ LACTU2020	Fixed income mathematics	Pierre Devolder	45h+15h	7 Credits	q1	x
○ LACTU2170	STOCHASTIC FINANCE	Donatien Hainaut	30h	5 Credits	q2	x
○ LINMA2725	Financial mathematics	Pierre Devolder	30h +22.5h	5 Credits	q1	x

o Droit des assurances (5 credits)

○ LDROP2021	Insurance Law	Bernard Dubuisson	30h	5 Credits	q2	x
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PROFESSIONAL FOCUS [30.0]

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

Year

1 2

o Content:

○ LACTU2210	Quantitative Risk Management	Christian Hafner	30h	5 Credits	q2	x	
○ LACTU2220	Asset and Liability Management ■	Jérôme Barbarin	30h	5 Credits	q2		x
○ LACTU2230	Health Insurance	Michel Denuit	45h	7 Credits	q2	x	
○ LACTU2240	Stochastic Finance in Insurance ■	Pierre Ars Pierre Devolder	30h	5 Credits	q2		x
○ LACTU2260	Actuarial Enterprise Risk Management ■	Philippe De Longueville	15h	3 Credits	q2		x
○ LACTU2270	Aspects actuariels des normes de solvabilité et comptables ■	Cindy Courtois	30h	5 Credits	q1		x

OPTIONS[> Cours au choix](#) [en-prog-2020-actu2m-lactu200o][> Optional courses](#) [en-prog-2020-actu2m-lsc100o]**COURS AU CHOIX [21.0]**

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

Students choose 21 credits of courses of which 10 credits KU Leuven or ULB courses.

Year

1 2

o Content:**⊗ Data science**

⊗ LSTAT2030	Statistique et data sciences avec R: Programmation avancée	Anouar El Ghouch	15h+15h	4 Credits	q2		x
⊗ LDATS2350	Data Mining	Robin Van Oirbeek	15h+15h	5 Credits	q2		x
⊗ LDATS2360	Seminar in data management: basic	Céline Bugli	15h+10h	5 Credits	q1	x	x
⊗ LSINF2275	Data mining & decision making	Marco Saerens	30h+15h	5 Credits	q2		x

⊗ Mathématiques de l'assurance

⊗ LACTU2410	Solvency of financial institutions (KUL-DOR58B)		39h	6 Credits	q1		x
⊗ LACTU2420	Foundations of Quantitative Risk Measurement (KUL-DOR57B)		39h	6 Credits	q1		x
⊗ LACTU2440	Actuarial and Financial Valuation Principles (KUL-DON57A)		39h	6 Credits	q1		x

⊗ Mathématiques de la finance

⊗ LACTU2450	Financial Engineering (KUL-GOQ22A)		26h+13h	6 Credits	q2		x
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						Year	
						1	2
⊗ LACTU2470	Statistical Tools for Quantitative Risk Management (KUL-GOQ24A)		39h	6 Credits	q1		x
⊗ LMAT2470	Processus stochastiques (statistique)	Donatien Hainaut	30h	5 Credits	q2		x
⊗ LSTAT2170	Times series	Rainer von Sachs	22.5h +7.5h	5 Credits	q2		x

⊗ Finance

⊗ LLSMS2013	Investments (in English)	Leonardo Iania	30h	5 Credits	q1		x
⊗ LLSMS2017	IAS/IFRS	Bruno Colmant	30h	5 Credits	q1		x
⊗ LLSMS2100	Corporate Finance (Names from A to K)	Philippe Grégoire Anh Nguyen (compensates Yue Zhang) James Thewissen	30h	5 Credits	q1		x

OPTIONAL COURSES

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

o Content:

⊗ LSST1001	IngénieuxSud	Jean-Pierre Raskin	15h+45h	5 Credits	q1+q2	x	x
⊗ LSST1002M	Information and critical thinking - MOOC	Myriam De Kesel Jim Plumet Jean-François Rees	30h+15h	3 Credits	q2	x	x

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:

- transform a prerequisite into a corequisite within the same year (to enable the student to continue his or her studies with a sufficient annual course load)
- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.

For more information, please consult the [Academic Regulations and Procedures](https://uclouvain.be/fr/decouvrir/rgee.html) (<https://uclouvain.be/fr/decouvrir/rgee.html>).

Prerequisites list

LACTU2220 "[Asset and Liability Management](#)" has prerequisite(s) LACTU2020 AND LACTU2170

- LACTU2020 - [Fixed income mathematics](#)
- LACTU2170 - [STOCHASTIC FINANCE](#)

LACTU2240 "[Stochastic Finance in Insurance](#)" has prerequisite(s) LINMA2725 AND LACTU2020 AND LACTU2170

- LINMA2725 - [Financial mathematics](#)
- LACTU2020 - [Fixed income mathematics](#)
- LACTU2170 - [STOCHASTIC FINANCE](#)

LACTU2260 "[Actuarial Enterprise Risk Management](#)" has prerequisite(s) LACTU2010 AND LACTU2030 AND LACTU2210 AND LINMA2725

- LACTU2010 - [NON LIFE INSURANCE](#)
- LACTU2030 - [LIFE INSURANCE](#)
- LACTU2210 - [Quantitative Risk Management](#)
- LINMA2725 - [Financial mathematics](#)

LACTU2270 "[Aspects actuariels des normes de solvabilité et comptables](#)" has prerequisite(s) LACTU2010 AND LACTU2030 AND LACTU2230

- LACTU2010 - [NON LIFE INSURANCE](#)
- LACTU2030 - [LIFE INSURANCE](#)
- LACTU2230 - [Health Insurance](#)

LACTU2280 "[Reinsurance and Alternative Risk Transfers](#)" has prerequisite(s) LACTU2010 AND LACTU2030 AND LACTU2210 AND LACTU2230

- LACTU2010 - [NON LIFE INSURANCE](#)
- LACTU2030 - [LIFE INSURANCE](#)
- LACTU2210 - [Quantitative Risk Management](#)
- LACTU2230 - [Health Insurance](#)

LACTU2900 "[Master thesis : research](#)" has prerequisite(s) LACTU2110 AND LACTU2170 AND LACTU2210 AND LACTU2230

- LACTU2110 - [Modélisation prédictive et apprentissage statistique en assurance](#)
- LACTU2170 - [STOCHASTIC FINANCE](#)
- LACTU2210 - [Quantitative Risk Management](#)
- LACTU2230 - [Health Insurance](#)

LACTU2910 "[Master Thesis : Project](#)" has prerequisite(s) LACTU2010 AND LACTU2030 AND LACTU2040

- LACTU2010 - [NON LIFE INSURANCE](#)
- LACTU2030 - [LIFE INSURANCE](#)
- LACTU2040 - [PENSION FUNDING](#)

LDATS2310 "[Data science for insurance and finance](#)" has prerequisite(s) LACTU2110

- LACTU2110 - [Modélisation prédictive et apprentissage statistique en assurance](#)

The programme's courses and learning outcomes

For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the competences expected of every graduate on completion of the programme. You can see the contribution of each teaching unit to the programme's reference framework of learning outcomes in the document "*In which teaching units are the competences and learning outcomes in the programme's reference framework developed and mastered by the student?*"

ACTU2M - Information

Access Requirements

In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail
Decree of 7 November 2013 defining the landscape of higher education and the academic organization of studies.
The admission requirements must be met prior to enrolment in the University.

SUMMARY

- > [Specific access requirements](#)
- > [University Bachelors](#)
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- > [Holders of a non-University 2nd cycle degree](#)
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- > [Admission and Enrolment Procedures for general registration](#)

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor : Business Engineering		Direct access	
Bachelor in Engineering		Direct access	
Bachelor in Mathematics		Direct access	
Bachelor in Physics		Direct access	
Bachelor in Economics and Management Bachelor in Computer Science	Direct access if they have succeeded the Minor in Statistics, Actuarial Sciences and Data Sciences .	-	In some cases, the UCLouvain Enrolment Office, after reviewing their online enrolment or re-enrolment application, will ask the students concerned to provide an enrolment authorisation from the faculty/ school.
Others Bachelors of the French speaking Community of Belgium			
Bachelor in Business Engineering Bachelor in Engineering Bachelor in Mathematics Bachelor in Physics		Direct access	
Bachelors of the Dutch speaking Community of Belgium			
Bachelor in ingenieurswetenschappen, oriëntatie civieltechniek Bachelor in de wiskundige wetenschappen Bachelor in de fysische wetenschappen		Access based on application	
Foreign Bachelors			
Bachelor in Business Engineering Bachelor in Engineering Bachelor in Mathematics Bachelor in Physics		Access based on application	

Non university Bachelors

> Find out more about [links](https://uclouvain.be/fr/etudier/passerelles) (https://uclouvain.be/fr/etudier/passerelles) to the university

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
"Licenciés" in Engineering, Mathematics, Physics, Statistics		Direct access	
Masters			
Master in Business engineering Master in Biomedical Engineering Master in Chemical and Materials Engineering Master in Civil Engineering Master in Computer Science and Engineering Master in Electrical Engineering Master in Electro-mechanical Engineering Master in Mathematical Engineering Master in Mechanical Engineering Master in Physical Engineering Master in Mathematics Master in Physics Master in Statistics		Direct access	
Master in Management Master in Economics Master in Computer Science	Direct access if they have completed the Minor in Statistics, Actuarial Sciences and Data Sciences .	-	In some cases, the UCLouvain Enrolment Office, after reviewing your online enrolment or re-enrolment application, will ask you to provide an enrolment authorisation from your faculty/ school.

Holders of a non-University 2nd cycle degree

Access based on validation of professional experience

> See the website [Valorisation des acquis de l'expérience](#)

It is possible to gain admission to all masters courses via the validation of professional experience procedure.

Entry to all Masters (with the exception of Advanced Masters) can be gained through the special procedure for accrediting prior learning and experience known as VAE (validation des acquis de l'expérience).

Access based on application

Reminder : all Masters (apart from Advanced Masters) are also accessible on file.

Foreign students who have completed a university education (minimum 3 years) with strong quantitative connotation and who have obtained at least 60% (or 12/20) of average for all successful university years in their home university, without the slightest failure in mathematics courses, calculation of probabilities and statistics, and with an average grade (70% or 14/20) in these disciplines during their previous course have the possibility to apply for admission to the program of the Master in Actuarial Science (120 ECTS).

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.

Supplementary classes

To access this Master, students must have a good command of certain subjects. If this is not the case, they must add supplementary classes at the beginning of their Master's programme in order to obtain the prerequisites for these studies.

● Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

⊗ UE supplémentaires

Pour les étudiants possédant un diplôme de 1er ou de 2ème cycle en sciences mathématiques ou physiques, un master en statistique ou en sciences des données, ou un diplôme de 1er ou de 2ème cycle en sciences de l'ingénieur, et qui n'auraient pas suivi de cours équivalents dans le cadre de ces programmes :

⊗ LECGE1212	Macroeconomics	Etienne De Callatay Hélène Latzer (compensates Fabio Mariani)	45h+15h	5 Credits	q1
⊗ LESPO1122	Foundations of Law	Pierre Bazier Nicolas Bonbled Arnaud Hoc Thibaut Slingeneijer de Goeswin	40h	5 Credits	q1 or q2

⊗ UE supplémentaire de statistique

Pour les étudiants possédant un diplôme de 1er ou de 2ème cycle en ingénieur de gestion et qui n'auraient pas suivi de cours équivalents dans le cadre de ce programme :

⊗ LSTAT2020	Statistical softwares and basic statistical programming	Céline Bugli	15h+15h	4 Credits	q1
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⊗ Cours de langue

En outre, le Jury appréciera la maîtrise de l'anglais par l'étudiant. Le cas échéant, le cours ci-dessous sera rajouté à son programme.

⊗ LANGL1330	English intermediate level - 1st part	Stéphanie Brabant Estelle Dagneaux Aurélié Deneumoustier Fanny Desterbecq Marie Duzel Amandine Dumont Jérémié Dupal (compensates Anne- Julie Toubeau) Carlo Lefevre Sandrine Mulkers (coord.) Marc Piwnik (coord.) Nevin Serbest Françoise Stas	20h	3 Credits	q1 or q2
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Teaching method

In addition to strong methodological contents, the cursus includes case studies, personal projects and an internship (optional) in an insurance or reinsurance company, consulting firm, pension fund.

Evaluation

The evaluation methods comply with the regulations concerning studies and exams (<https://uclouvain.be/fr/decouvrir/rgee.html>). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

Depending on the course, the exam may be oral or written and may include a personal project. The master thesis is defended publicly.

Mobility and/or Internationalisation outlook

Besides the active collaboration with the KULeuven and ULB master in actuarial studies, the optional internship may take place abroad (Paris, London or Luxembourg, for instance).

Possible trainings at the end of the programme

Advanced Masters

The Master in Actuarial Science is not a requirement for any particular Advanced Masters.

Doctoral programme

Holders of a Master in Actuarial Science may enrol for the doctoral programme in Actuarial Science, subject to some conditions (e.g. higher level pass).

Certificates

In addition to the master in actuarial science, CPD activities are organized as University certificates, under the auspices of the University Institute for Continuing Education (Institut universitaire de formation continue - IUFC).

Contacts

Curriculum Management

Entity

Structure entity

Denomination

Faculty

Sector

Acronym

Postal address

SST/SC/LSBA

(LSBA)

Faculty of Science (SC)

Sciences and Technology (SST)

LSBA

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Website

Academic supervisor: Michel Denuit

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- Pierre Devolder
- Donatien Hainaut

Useful Contact(s)

- Pierre Devolder
- Sophie Malali

