

**At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In french**Dissertation/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: **Faculté des sciences (SC)**Programme acronym: **actu2m** - Francophone Certification Framework: 7**Table of contents**

Introduction .....	2
Teaching profile .....	3
- Learning outcomes .....	3
- Programme structure .....	4
- Detailed programme .....	5
- Programme by subject .....	5
- Course prerequisites .....	9
- The programme's courses and learning outcomes .....	9
Information .....	10
- Admission .....	10
- Supplementary classes .....	12
- Teaching method .....	13
- Evaluation .....	13
- Mobility and/or Internationalisation outlook .....	13
- Possible trainings at the end of the programme .....	13
- Certificates .....	13
- Contacts .....	13

## ACTU2M - Introduction

### Introduction

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## 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

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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-2019-actu2m-lactu200t.html ]

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[> Professional Focus](#) [ en-prog-2019-actu2m-lactu200s ]

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Options courses

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[> Cours au choix](#) [ en-prog-2019-actu2m-lactu200o.html ]

[> Cours facultatif : Ingénieurs Sud](#) [ en-prog-2019-actu2m-lsst100o.html ]

## ACTU2M Detailed programme

### Programme by subject

#### CORE COURSES [69.0]

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

Year

1 2

#### ○ Mémoire au choix (15 credits)

Course ID	Course Title	Credits	Year 1	Year 2
⊗ LACTU2900	Master thesis : research ■	15 Credits	1 ou 2q	x
⊗ LACTU2910	Master Thesis : Project ■	15 Credits	1 ou 2q	x

#### ○ Data science (10 credits)

Course ID	Course Title	Instructor	Hours	Credits	Year 1	Year 2
○ LACTU2110	Modélisation prédictive et apprentissage statistique en assurance	Michel Denuit Julien Trufin (compensates Michel Denuit)	45h	7 Credits	2q	x
○ LDATS2310	Data science for insurance and finance ■	Donatien Hainaut	15h	3 Credits	1q	x

#### ○ Mathématiques de l'assurance (22 credits)

Course ID	Course Title	Instructor	Hours	Credits	Year 1	Year 2
○ LACTU2010	NON LIFE INSURANCE	Michel Denuit	45h	7 Credits	1q	x
○ LACTU2030	LIFE INSURANCE	Donatien Hainaut	45h	7 Credits	1q	x
○ LACTU2040	PENSION FUNDING	Sébastien de Valeriola (compensates Pierre Devolder Pierre Devolder)	30h+15h	5 Credits	2q	x
○ LACTU2280	Reinsurance and Alternative Risk Transfers ■	Jean-François Walhin	15h	3 Credits	1q	x

#### ○ Mathématiques de la finance (17 credits)

Course ID	Course Title	Instructor	Hours	Credits	Year 1	Year 2
○ LACTU2020	Fixed income mathematics	Pierre Devolder	45h+15h	7 Credits	1q	x
○ LACTU2170	STOCHASTIC FINANCE	Donatien Hainaut	30h	5 Credits	2q	x
○ LINMA2725	Financial mathematics	Pierre Devolder	30h +22.5h	5 Credits	1q	x

#### ○ Droit des assurances (5 credits)

Course ID	Course Title	Instructor	Hours	Credits	Year 1	Year 2
○ LDROP2021	Insurance Law	Bernard Dubuisson	30h	5 Credits	2q	x

**PROFESSIONAL FOCUS [30.0]**

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

Year

1 2

**o Contenu:**

○ LACTU2210	<a href="#">Quantitative Risk Management</a>	Christian Hafner	30h	5 Credits	2q	x	
○ LACTU2220	<a href="#">Asset and Liability Management</a> ■	Jérôme Barbarin	30h	5 Credits	2q		x
○ LACTU2230	<a href="#">Health Insurance</a>	Michel Denuit	45h	7 Credits	2q	x	
○ LACTU2240	<a href="#">Stochastic Finance in Insurance</a> ■	Pierre Ars Pierre Devolder Adrien Lebègue (compensates Pierre Devolder)	30h	5 Credits	2q		x
○ LACTU2260	<a href="#">Actuarial Enterprise Risk Management</a> ■	Philippe De Longueville	15h	3 Credits	2q		x
○ LACTU2270	<a href="#">Aspects actuariels des normes de solvabilité et comptables</a> ■	Cindy Courtois	30h	5 Credits	1q		x

## OPTIONS

- > Cours au choix [ en-prog-2019-actu2m-lactu200o ]  
> Cours facultatif : Ingénieurs Sud [ en-prog-2019-actu2m-lsst100o ]

## COURS AU CHOIX [21.0]

Students choose 15 credits of courses of which 12 credits KUL courses.

- Mandatory  
 Courses not taught during 2019-2020  
 Periodic courses taught during 2019-2020
  Optional  
 Periodic courses not taught during 2019-2020  
 Activity with requisites

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

Year

1 2

### o Contenu:

#### ⊗ Data science

⊗ LSTAT2030	Statistique et data sciences avec R: Programmation avancée	Anouar El Ghouch	15h+15h	4 Credits	2q		x
⊗ LSTAT2350	Data Mining	Tim Verdonck	15h+15h	5 Credits	2q		x
⊗ LSTAT2360	Seminar in data management: basic	Céline Bugli	15h+10h	5 Credits	1q	x	x
⊗ LSINF2275	Data mining & decision making	Marco Saerens	30h+15h	5 Credits	2q		x

#### ⊗ Mathématiques de l'assurance

⊗ LACTU2410	Solvency of financial institutions (KUL-DOR58B)		39h	6 Credits	1q		x
⊗ LACTU2420	Foundations of Quantitative Risk Measurement (KUL-DOR57B)		39h	6 Credits	1q		x
⊗ LACTU2440	Actuarial and Financial Valuation Principles (KUL-DON57A)		39h	6 Credits	1q		x
⊗ LACTU2610	Processus stochastiques et applications en assurance (ULB-STAT-F409)		24h+12h	5 Credits	2q		x

#### ⊗ Mathématiques de la finance

⊗ LACTU2450	Financial Engineering (KUL-GOQ22A)		26h+13h	6 Credits	2q		x
⊗ LACTU2470	Statistical Tools for Quantitative Risk Management (KUL-GOQ24A)		39h	6 Credits	1q		x
⊗ LACTU2600	Lévy processes in finance and insurance (ULB-ACTU-F402)		24h+12h	5 Credits	1q	△	x
⊗ LMAT2470	Processus stochastiques (statistique)	Donatien Hainaut	30h	5 Credits	2q	x	x
⊗ LSTAT2170	Times series	Rainer von Sachs	22.5h +7.5h	5 Credits	2q		x

#### ⊗ Finance

⊗ LACTU2620	Banking and asset management (ULB-GEST - S414)		36h	5 Credits	1q		x
⊗ LLSMS2013	Investments (in English)	Renaud Beaupain (compensates Leonardo Iania) Leonardo Iania Anh Nguyen	30h	5 Credits	1q	x	x
⊗ LLSMS2017	IAS/IFRS	Bruno Colmant	30h	5 Credits	1q		x
⊗ LLSMS2100	Corporate Finance (Names from A to K)	Bruno Colmant Philippe Grégoire Anh Nguyen (compensates Philippe Grégoire) James Thewissen	30h	5 Credits	1q	x	x





**COURS FACULTATIF : INGÉNIEUX SUD**

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

Year

1 2

## ○ Contenu:

⊗ LSST1001	<a href="#">IngénieuxSud</a>	Jean-Pierre Raskin	15h+45h	5 Credits	1 + 2q	x	x
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**Course prerequisites**

A document entitled (nb: not available for this programme actu2m) specifies the activities (course units - CU) with one or more prerequisite(s) within the study programme, that is the CU whose learning outcomes must have been certified and for which the credits must have been granted by the jury before the student is authorised to sign up for that activity.

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

As the prerequisites are a requirement of enrolment, there are none within a year of a course.

The prerequisites are defined for the CUs for different years and therefore influence the order in which the student can enrol in the programme's CUs.

In addition, when the panel validates a student's individual programme at the beginning of the year, it ensures the consistency of the individual programme:

- It can change a prerequisite into a corequisite within a single year (to allow studies to be continued with an adequate annual load);
- It can require the student to combine enrolment in two separate CUs it considers necessary for educational purposes.

For more information, please consult [regulation of studies and exams](https://uclouvain.be/fr/decouvrir/rgee.html) (<https://uclouvain.be/fr/decouvrir/rgee.html>).

**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

### Admission

*General* (<https://uclouvain.be/en/study/inscriptions/admission-requirements-master-s-degree.html>) and specific admission requirements for this program must be satisfied at the time of enrolling at the university.

**In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail.**

#### SUMMARY

- > [University Bachelors](#)
- > [Non university Bachelors](#)
- > [Holders of a 2nd cycle University degree](#)
- > [Holders of a non-University 2nd cycle degree](#)
- > [Adults taking up their university training](#)
- > [Access on the file](#)
- > [Admission and Enrolment Procedures for general registration](#)

### University Bachelors

Diploma	Special Requirements	Access	Remarks
<b>UCLouvain Bachelors</b>			
<a href="#">Bachelor : Business Engineering</a>		Direct Access	
<a href="#">Bachelor in Engineering</a>		Direct Access	
<a href="#">Bachelor in Mathematics</a>		Direct Access	
<a href="#">Bachelor in Physics</a>		Direct Access	
<a href="#">Bachelor in Economics and Management</a> <a href="#">Bachelor in Computer Science</a>	Direct access if they have succeeded the <a href="#">Minor in Statistics, Actuarial Sciences and Data Sciences</a> .	-	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.
<b>Others Bachelors of the French speaking Community of Belgium</b>			
<a href="#">Bachelor in Business Engineering</a> <a href="#">Bachelor in Engineering</a> <a href="#">Bachelor in Mathematics</a> <a href="#">Bachelor in Physics</a>		Direct Access	
<b>Bachelors of the Dutch speaking Community of Belgium</b>			
<a href="#">Bachelor in ingenieurswetenschappen, oriëntatie civieltechniek</a> <a href="#">Bachelor in de wiskundige wetenschappen</a> <a href="#">Bachelor in de fysische wetenschappen</a>		Based on application: accepted, conditional on further training, or refusal	
<b>Foreign Bachelors</b>			
<a href="#">Bachelor in Business Engineering</a> <a href="#">Bachelor in Engineering</a> <a href="#">Bachelor in Mathematics</a> <a href="#">Bachelor in Physics</a>		Based on application: accepted, conditional on further training, or refusal	

### 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
<b>"Licenciés"</b>			
"Licenciés" in Engineering, Mathematics, Physics, Statistics		Direct Access	
<b>Masters</b>			
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 <a href="#">Minor in Statistics, Actuarial Sciences and Data Sciences</a> .	-	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

### Adults taking up their university training

> See the website [Valorisation des acquis de l'expérience](https://uclouvain.be/fr/etudier/vae) (https://uclouvain.be/fr/etudier/vae)

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 on the file

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).

### 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 enrol for this Masters, the student must have a good command of certain subjects. If this is not the case, they must add preparatory modules to their Master's programme.**

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ 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 Fabio Mariani	45h+15h	5 Credits	1q
⊗ LESPO1122	Foundations of Law	Nicolas Bonbled Jean-Marc Hausman Thibaut Slingeneyer de Goeswin	40h	5 Credits	1 ou 2q

### ⊗ 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 équivalent dans le cadre de ce programme :

⊗ LSTAT2020	Statistical softwares and basic statistical programming	Céline Bugli	15h+15h	4 Credits	1q
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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	Catherine Avery Jean-Luc Delghust Aurélie Deneumoustier Marie Duzel Amandine Dumont Céline Gouverneur Carlo Lefevre Lucille Meyers Sandrine Mulkers (coord.) Marc Piwnik (coord.) Nevin Serbest Colleen Starrs Anne-Julie Toubeau Quentin Zèques (compensates Aurélie Deneumoustier)	20h	3 Credits	1 ou 2q
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## Teaching method

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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

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**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

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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

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### 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

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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

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**Attention, you are currently reading an archived page: below contact informations were for program study 2019-2020 only. To get current contact informations please got to [current program study site](#).**

## Curriculum Management

Entity	
Structure entity	SST/SC/LSBA
Denomination	(LSBA) ( <a href="https://uclouvain.be/repertoires/entites/lsba">https://uclouvain.be/repertoires/entites/lsba</a> )
Faculty	Faculty of Science (SC) ( <a href="https://uclouvain.be/repertoires/entites/sc">https://uclouvain.be/repertoires/entites/sc</a> )
Sector	Sciences and Technology (SST) ( <a href="https://uclouvain.be/repertoires/entites/sst">https://uclouvain.be/repertoires/entites/sst</a> )
Acronym	LSBA
Postal address	Voie du Roman Pays 20 - bte L1.04.01 1348 Louvain-la-Neuve Tel: <a href="tel:+3227734314">+32 (0) 10 47 43 14</a> - Fax: <a href="tel:+3227734332">+32 (0) 10 47 30 32</a>
Web site	<a href="https://uclouvain.be/fr/facultes/sc/lsba">https://uclouvain.be/fr/facultes/sc/lsba</a> ( <a href="https://uclouvain.be/fr/facultes/sc/lsba">https://uclouvain.be/fr/facultes/sc/lsba</a> )
Academic supervisor: Michel Denuit	
Jury	

- Pierre Devolder
- Donatien Hainaut

Useful Contact(s)

- Sophie Malali

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