Programme-specific Section of the Curriculum for the MSc Programme in

Actuarial Mathematics

at the Faculty of Science, University of Copenhagen

2010 (Rev. 2024)

Contents

1 Title, affiliation and language
A shared section that applies to all BSc, part-time MSc and MSc Programmes at the Faculty of Science is linked to this programme-specific curriculum.

1.1 Title
The MSc Programme in Actuarial Mathematics leads to a Master of Science (MSc) in Actuarial Mathematics with the Danish title: *Cand.act. (candidatus/candidata actuariae)*.

1.2 Affiliation
The programme is affiliated with the Study Board of Mathematics and Computer Science, and the students can both elect, and be elected, to this study board.

1.3 Corps of external examiners
The following corps of external examiners is used for the central parts of the MSc Programme:

- Corps of External Examiners for Mathematics (*matematik*).

1.4 Language
The language of this MSc Programme is English.

2 Academic profile
2.1 Purpose
The MSc programme in Actuarial Mathematics is a research-based programme, the objective of which is to provide the student with the mathematical knowledge and insights required to work independently and in a professionally sound manner in areas that require actuarial competences, such as the insurance and pensions profession, and to contribute to the further theoretical development of actuarial mathematics.

2.2 General programme profile
The programme provides a general introduction to both life and non-life insurance mathematics with an emphasis on the monitoring, measurement and mitigation of risks in relation to insurance and pensions. The student can subsequently specialise in one of these disciplines or in fields such as risk management, financial theory, stochastic processes, applied probability, statistical analysis and machine learning.

Actuarial mathematics, probability theory, finance, statistics and computer science are the key subject areas of the programme.

2.3 General structure of the programme
The MSc Programme is set at 120 ECTS.

There are no defined specialisations in this programme.

2.4 Career opportunities
The MSc Programme in Actuarial Mathematics qualifies students to become professionals within business functions and/or areas such as:

- A PhD programme
- Actuarial roles in insurance and pension companies.
- Risk management in the banking sector.
- Legislative and regulative authorities.
- Specialized software development.

3 Description of competence profiles

Students following the MSc Programme acquire the knowledge, skills and competences listed below. Students will also acquire other qualifications through elective subject elements and other study activities.

3.1 Competence profile

Graduates holding an MSc in Actuarial Mathematics have acquired the following:

Knowledge about:

- General theory for stochastic processes, including martingales, stochastic integrals, and Markov processes.
- Stochastic differential equations with applications to finance and life insurance.
- Fixed income theory and market reserves.
- Design and management of participating and unit-linked pension products.
- Parametric and non-parametric statistical methods for insurance applications.
- Claims reserving.
- Risk measures and extreme value theory.
- Dependence modelling.
- Credit risk modelling.
- Selected research-active fields within life and non-life insurance mathematics.

Skills in/to:

- Read and understand actuarial mathematical and statistical research papers.
- Communicate actuarial mathematical issues on a scientific basis.
- Account orally and in writing for inquiries into open actuarial mathematical issues.
- Derive and solve (stochastic) differential equations describing actuarial problems.
- Determine arbitrage free prices for financial claims.
- Compute and determine the appropriateness of various risk measures such as value-at-risk and expected shortfall .
- Apply and analyse statistical and financial models for insurance applications.

Competences in/to:

- Structure an inquiry into open actuarial mathematical issues, regarding both life and non-life insurance mathematics and divide it into smaller easily accessible challenges.
- Develop and adapt probabilistic and statistical models for real-life challenges.
- Conduct independent, stringent argumentation.
- Independently take responsibility for his or her own professional development and specialisation.
- Reflect on methodologies for analysing and solving actuarial mathematical issues at a scientific level.

4 Admission requirements

4.1 Bachelor's degrees that automatically fulfil the academic requirements

Applicants with one of the following Bachelor's degrees automatically fulfil the academic requirements for admission to the MSc Programme in Actuarial Mathematics:

- Actuarial Mathematics (*forsikringsmatematik*) from University of Copenhagen (reserved access)

4.2 Other Bachelor's degrees

Applicants with a Bachelor's degree, Professional Bachelor's degree or equivalent from Danish or international universities other than those listed in 4.1 are qualified for admission to the MSc Programme in Statistics if the programme includes the following:

- Subject elements in life insurance mathematics (equivalent in content to the course *Grundlæggende livsforsikringsmatematik*) (at least 7.5 ECTS).
- Subject elements in non-life insurance mathematics (equivalent in content to the course Basic Non-life Insurance Mathematics) (at least 7.5 ECTS)
- Subject elements in statistics on a measure-theoretical basis (equivalent in content to the course *Statistiske metoder*, *Matematisk statistik (MStat*), *Regression*/Regression for Actuaries) (at least 22.5 ECTS).
- Subject elements in advanced probability (equivalent in content to the course *Sandsynlighedsteori 2*) (at least 7.5 ECTS)
- Subject elements in accounting and law (equivalent in content to the course *Regnskab og jura*) at least 7.5 ECTS
- Subject elements in mathematical finance (equivalent in content to the course *Finansiering 1*) at least 7.5 ECTS

4.3 Other applicants

The Faculty may also admit applicants who, after an individual academic assessment, are assessed to possess educational qualifications equivalent to those required in Subclauses 4.1-3.

4.4 Language requirements

Applicants must as a minimum document English language qualifications comparable to a Danish upper secondary school English B level or English proficiency corresponding to the tests and scores required. Accepted tests and required minimum scores are published online at www.science.ku.dk.

4.5 Supplementary subject elements

The qualifications of an applicant to the MSc programme are assessed exclusively on the basis of the qualifying Bachelor's degree. Supplementary subject elements passed between the completion of the Bachelor's program and the admission to the MSc programme cannot be included in the overall assessment.

However, subject elements passed before the completion of the Bachelor's programme may be included in the overall assessment. This includes subject elements completed as continuing education as well as subject elements completed as part of a former higher education program. A maximum of 30 ECTS supplementary subject elements can be included in the overall assessment.

Subject elements passed before completing the Bachelor's programme which are to form part of the MSc programme to which the student has a legal right of admission (§15-courses) cannot be included in the overall assessment.

5 Prioritisation of applicants

With a Bachelor's degree in Actuarial Mathematics from University of Copenhagen, the student is granted reserved access and guaranteed a place on the MSc Programme in Actuarial Mathematics if the student applies in time to begin the MSc Programme within three years of the completion of the Bachelor's degree.

If the number of qualified applicants to the programme exceeds the number of places available, applicants will be prioritised according to the following criteria:

- Total number of ECTS within actuarial mathematics.

6 Structure of the programme

The compulsory subject elements, restricted elective subject elements and the thesis constitute the central parts of the programme (Section 30 of the Ministerial Order on Bachelor and Master's Programmes (Candidatus) at Universities).

6.1 Programme components

The programme is set at 120 ECTS and consists of the following:

- Compulsory subject elements, 45 ECTS.
- Restricted elective subject elements, 15 ECTS
- Elective subject elements, 30 ECTS.
- Thesis, 30 ECTS.

6.1.1 Compulsory subject elements

All of the following subject elements are to be covered (45 ECTS):			
Course Code	**Course Title**	**Block**	**ECTS**
NMAK24001U	Mathematical Finance (MathFin)	Block 1+2	15 ECTS
NMAK24005U	Statistics for Insurance (StatIns)	Block 1+2	15 ECTS
NMAK10020U	Quantitative Risk Management (QRM)	Block 3	7.5 ECTS
NMAK24013U	Topics in Life Insurance (Liv2)	Block 3	7.5 ECTS

6.1.2 Restricted elective subject elements

15 ECTS are to be covered by subject elements from the following list:			
Course Code	**Course Title**	**Block**	**ECTS**
NMAK18000U	An Introduction to Large Deviations*	Block 1	7.5 ECTS
NMAK22016U	Term Structure Models	Block 4	7.5 ECTS
NMAK22012U	Reserving In Non-Life Insurance	Block 1	7.5 ECTS
NMAK22001U	Consumption-Investment Problems*	Block 1	7.5 ECTS
NMAK24011U	Financial Econometric Time Series Analysis (FinMetrics)	Block 1	7.5 ECTS
NMAK13005U	Introduction to Extreme Value Theory (IntroExtremValue)	Block 2	7.5 ECTS
NMAK17007U	Monte Carlo Methods in Insurance and Finance	Block 2	7.5 ECTS
NMAK16015U	Optimal Stopping with Applications*	Block 2	7.5 ECTS
NMAK19003U	Applied Probability	Block 1	7.5 ECTS
NMAK15010U	Continuous Time Finance 2: (FinKont2)	Block 3	7.5 ECTS
NMAK23006U	Interpretable Machine Learning	Block 4	7.5 ECTS
NMAK22010U	Projects in the mathematics of life insurance*	Block 4	7.5 ECTS
NMAK24003U	Design and Risk Management in Life Insurance	Block 4	7.5 ECTS

*The course is not offered in the academic year 2024/25

6.1.3 Elective subject elements

30 ECTS are to be covered as elective subject elements.

- All subject elements at MSc level may be included as elective subject elements in the MSc Programme.
- BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme.
- Projects. See 6.1.4 Projects.

6.1.4 Projects

- Projects outside the course scope may be included in the elective section of the programme with up to 15 ECTS**.** The regulations are described in Appendix 5 to the shared section of the curriculum.
- Projects in practice may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.
- Thesis preparation projects may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 6 to the shared section of the curriculum.

6.1.5 Thesis

The MSc Programme in Actuarial Mathematics includes a thesis corresponding to 30 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

6.1.6 Academic Mobility

For students admitted in September the academic mobility for the MSc Programme in Actuarial Mathematics is placed in block 1+2 of the 2nd year.

For students admitted in February the academic mobility for the MSc Programme in Actuarial Mathematics is placed in block 3+4 of the 1st year.

Academic mobility requires that the student follows the rules and regulations regarding pre-approval and credit transfer.

In addition, the student has the possibility to arrange similar academic mobility in other parts of the programme.

7 Exemptions

In exceptional circumstances, the study board may grant exemptions from the rules in the curriculum specified solely by the Faculty of Science.

8 Commencement etc.

8.1 Validity

This subject specific section of the curriculum applies to all students enrolled in the programme – see however Appendix 2.

8.2 Transfer

Students enrolled on previous curricula may be transferred to the new one as per the applicable transfer regulations or according to an individual credit transfer by the study board.

8.3 Amendments

The curriculum may be amended once a year so that any changes come into effect at the beginning of the academic year. Amendments must be proposed by the study board and approved by the Dean.

Notification about amendments that tighten the admission requirements for the programme will be published online at www.science.ku.dk one year before they come into effect.

If amendments are made to this curriculum, an interim arrangement may be added if necessary to allow students to complete their MSc Programme according to the amended curriculum.

Appendix 1 The recommended academic progression

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.

Tables for students admitted to the programme in September (summer):

Table – MSc Programme in Actuarial Mathematics

	Block 1	Block 2	Block 3	Block 4
1st year	Mathematical Finance		Quantitative Risk Management	Restricted Elective
	Statistics for Insurance		Topics in Life Insurance	Restricted Elective
2nd year	Elective	Elective	Thesis	
	Elective	Elective		

Table for students admitted to the programme in February (winter):

Table – MSc Programme in Actuarial Mathematics*

	Block 3	Block 4	Block 1	Block 2
1st year	Quantitative Risk Management	Elective	Mathematical Finance	
	Elective	Elective	Statistics for Insurance	
2nd year	Topics in Life Insurance	Restricted Elective	Thesis	
	Elective	Restricted elective		

*This table is only relevant for students who begin the MSc Programme in February (block 3).

Appendix 2 Interim arrangements

The Shared Section that applies to all BSc, part-time MSc and MSc Programmes at the Faculty of Science applies to all students.

The interim arrangements below only consist of parts where the current curriculum differs from the rules and regulations that were previously valid. Therefore, if information about relevant rules and regulations are missing, it can be found in the curriculum above.

1 General changes for students admitted in the academic year 2023/24

Students admitted to the MSc Programme in the academic year 2023/24 must finish the programme as listed in the curriculum above with the following exceptions.

Table – MSc Programme in Actuarial Mathematics

	Block 1	Block 2	Block 3	Block 4
1st year	***Stochastic Processes in Non-life Insurance***	**Quantitative Risk Management* (NMAK10020U)**	**Elective**	**Elective**
	Stochastic Processes in Life Insurance (NMAA05115U)	**Continuous Time Finance (NMAA05113U)**	***Topics in Life Insurance***	**Topics in Non-life Insurance (NMAA06068U)**
2nd year	**Restricted elective**	**Restricted elective**	**Thesis**	
	Elective	**Elective**		

Subject elements in italics have been discontinued. See discontinued courses below.
*From the academic year 2024/25 the course is offered in block 3.

NMAA05115U Stochastic Processes in Life Insurance (LivStok), 7.5 ECTS and NMAA05113U Continuous Time Finance (FinKont) 7.5 ECTS can together be replaced by NMAK24001U Mathematical Finance, 15 ECTS.

Restricted elective subject elements

15 ECTS are to be covered by courses from the following list:			
Restricted elective subject elements offered as part of this curriculum (see above)			
NDAK22000U	Machine Learning A (MLA)	Block 1	7.5 ECTS
NMAK11022U	Regression (Reg)	Block 1	7.5 ECTS
NMAK16005U	Computational Statistics	Block 1	7.5 ECTS
NMAA05025U	Econometrics 2: Statistical Analysis of Econometric Time Series (StatØ2)	*Discontinued**	7.5 ECTS
NMAK19001U	Applied Operations Research	Block 2	7.5 ECTS
NDAK22001U	Machine Learning B (MLB)	Block 4	7.5 ECTS
NMAK22008U	Point Processes	Block 2	7.5 ECTS
NMAK20003U	Statistics A (StatA)	Block 2	7.5 ECTS
NMAK23005U	Inference for stochastic differential equations**	Block 2	7.5 ECTS
NMAK23003U	Convex optimization and equilibrium modelling**	Block 2	7.5 ECTS
NDAA09009U	Numerical Optimisation (NO)	Block 3	7.5 ECTS
NMAK20004U	Statistics B (StatB)	Block 3	7.5 ECTS
NMAK20002U	Semiparametric Inference**	Block 3	7.5 ECTS
NMAK23011U	Modeling and estimation for health and disability insurance	*Discontinued**	7.5 ECTS
NMAK16004U	Computational Finance**	Block 4	7.5 ECTS
NDAK22002U	Advanced Deep Learning (ADL)	*Discontinued**	7.5 ECTS
NDAK21003U	Online and Reinforcement Learning (OReL)	Block 3	7.5 ECTS

NDAK14007U	Applied Programming (APP)	Block 4	7.5 ECTS
NMAK22003U	Empirical bayes and generalized mixed linear models	*Discontinued**	7.5 ECTS
NMAK14028U	Project in Statistics (ProjStat)	Block 4	7.5 ECTS
NMAK17001U	Causality	Block 4	7.5 ECTS
NMAA09045U	Finance 2: Dynamic Portfolio Research (Fin2)	Block 4	7.5 ECTS
NMAK15004U	Advanced Operations Research: Stochastic Programming	Block 4	7.5 ECTS
NMAK23002U	Computational Methods in Non-life Insurance	*Discontinued**	7.5 ECTS

* See discontinued courses below
**The course is not offered in the academic year 2024/25

2 General changes for students admitted in the academic year 2022/23

Table – MSc Programme in Actuarial Mathematics

	Block 1	Block 2	Block 3	Block 4
1st year	***Stochastic Processes in Non-life Insurance***	**Quantitative Risk Management* (NMAK10020U)**	**Elective**	**Elective**
	Stochastic Processes in Life Insurance (NMAA05115U)	**Continuous Time Finance (NMAA05113U)**	***Topics in Life Insurance***	**Topics in Non-life Insurance (NMAA06068U)**
2nd year	**Restricted elective**	**Restricted elective**	**Thesis**	
	Elective	**Elective**		

Subject elements in italics have been discontinued. See discontinued courses below.
*From the academic year 2024/25 the course is offered in block 3.

NMAA05115U Stochastic Processes in Life Insurance (LivStok), 7.5 ECTS and NMAA05113U Continuous Time Finance (FinKont) 7.5 ECTS can together be replaced by NMAK24001U Mathematical Finance, 15 ECTS.

Restricted elective subject elements

15 ECTS are to be covered by courses from the following list:			
Restricted elective subject elements offered as part of this curriculum (see above).			
NMAK22019U	Machine Learning Methods in Non-Life Insurance	*Discontinued**	7.5 ECTS
NMAK22014U	Seminar in Statistics	Block 1	7.5 ECTS
NDAK22000U	Machine Learning A (MLA)	Block 1	7.5 ECTS
NMAK11022U	Regression (Reg)	Block 1	7.5 ECTS
NMAK16005U	Computational Statistics	Block 1	7.5 ECTS
NMAA05025U	Econometrics 2: Statistical Analysis of Econometric Time Series (StatØ2)	*Discontinued**	7.5 ECTS
NMAK19001U	Applied Operations Research	Block 2	7.5 ECTS
NDAK22001U	Machine Learning B (MLB)	Block 4	7.5 ECTS
NMAK22008U	Point Processes	Block 2	7.5 ECTS
NMAK20003U	Statistics A (StatA)	Block 2	7.5 ECTS
NMAK23005U	Inference for stochastic differential equations**	Block 2	7.5 ECTS
NMAK23003U	Convex optimization and equilibrium modelling**	Block 2	7.5 ECTS
NDAA09009U	Numerical Optimisation (NO)	Block 3	7.5 ECTS
NMAK20004U	Statistics B (StatB)	Block 3	7.5 ECTS
NMAK20002U	Semiparametric Inference**	Block 3	7.5 ECTS
NMAK23011U	Modeling and estimation for health and disability insurance	*Discontinued**	7.5 ECTS
NMAK16004U	Computational Finance**	Block 4	7.5 ECTS

NDAK22002U	Advanced Deep Learning (ADL)	*Discontinued**	7.5 ECTS
NDAK21003U	Online and Reinforcement Learning (OReL)	Block 3	7.5 ECTS
NDAK14007U	Applied Programming (APP)	Block 4	7.5 ECTS
NMAK22003U	Empirical bayes and generalized mixed linear models	*Discontinued**	7.5 ECTS
NMAK14028U	Project in Statistics (ProjStat)	Block 4	7.5 ECTS
NMAK17001U	Causality	Block 4	7.5 ECTS
NMAA09045U	Finance 2: Dynamic Portfolio Research (Fin2)	Block 4	7.5 ECTS
NMAK15004U	Advanced Operations Research: Stochastic Programming	Block 4	7.5 ECTS
NMAK23002U	Computational Methods in Non-life Insurance	*Discontinued**	7.5 ECTS

* See discontinued courses below
**The course is not offered in the academic year 2024/25

3 General changes for students admitted in the academic year 2021/22

Table – MSc Programme in Actuarial Mathematics

	Block 1	Block 2	Block 3	Block 4
1st year	***Stochastic Processes in Non-life Insurance***	**Quantitative Risk Management* (NMAK10020U)**	**Elective**	**Elective**
	Stochastic Processes in Life Insurance (NMAA05115U)	**Continuous Time Finance (NMAA05113U)**	***Topics in Life Insurance***	**Topics in Non-life Insurance (NMAA06068U)**
2nd year	**Restricted elective**	**Restricted elective**	**Thesis**	
	Elective	**Elective**		

Subject elements in italics have been discontinued. See discontinued courses below.
*From the academic year 2024/25 the course is offered in block 3.

NMAA05115U Stochastic Processes in Life Insurance (LivStok), 7.5 ECTS and NMAA05113U Continuous Time Finance (FinKont) 7.5 ECTS can together be replaced by NMAK24001U Mathematical Finance, 15 ECTS.

Restricted elective subject elements

15 ECTS are to be covered by courses from the following list:			
Restricted elective subject elements offered as part of this curriculum (see above).			
NMAK19004U	Advanced Topics in Modern Life Insurance	*Discontinued**	7.5 ECTS
NMAK19005U	Advances in Life Insurance Mathematics	*Discontinued**	7.5 ECTS
NMAK16006U	Consumption-Investment-Insurance Problems	*Discontinued**	7.5 ECTS
NMAK21012U	Pension Systems	*Discontinued**	7.5 ECTS
NMAK17005U	Machine Learning Methods in Non-Life Insurance	*Discontinued**	7.5 ECTS
NMAK22019U	Machine Learning Methods in Non-Life Insurance	*Discontinued**	7.5 ECTS
NMAK22014U	Seminar in Statistics	Block 1	7.5 ECTS
NDAK22000U	Machine Learning A (MLA)	Block 1	7.5 ECTS
NMAK11022U	Regression (Reg)	Block 1	7.5 ECTS
NMAK16005U	Computational Statistics	Block 1	7.5 ECTS
NMAA05025U	Econometrics 2: Statistical Analysis of Econometric Time Series (StatØ2)	*Discontinued**	7.5 ECTS
NMAK19001U	Applied Operations Research	Block 2	7.5 ECTS
NDAK22001U	Machine Learning B (MLB)	Block 4	7.5 ECTS
NMAK22008U	Point Processes	Block 2	7.5 ECTS
NMAK20003U	Statistics A (StatA)	Block 2	7.5 ECTS

NMAK23005U	Inference for stochastic differential equations**	Block 2	7.5 ECTS
NMAK23003U	Convex optimization and equilibrium modelling**	Block 2	7.5 ECTS
NDAA09009U	Numerical Optimisation (NO)	Block 3	7.5 ECTS
NMAK20004U	Statistics B (StatB)	Block 3	7.5 ECTS
NMAK20002U	Semiparametric Inference**	Block 3	7.5 ECTS
NMAK23011U	Modeling and estimation for health and disability insurance	*Discontinued**	7.5 ECTS
NMAK16004U	Computational Finance**	Block 4	7.5 ECTS
NDAK22002U	Advanced Deep Learning (ADL)	*Discontinued**	7.5 ECTS
NDAK21003U	Online and Reinforcement Learning (OReL)	Block 3	7.5 ECTS
NDAK14007U	Applied Programming (APP)	Block 4	7.5 ECTS
NMAK22003U	Empirical bayes and generalized mixed linear models	*Discontinued**	7.5 ECTS
NMAK14028U	Project in Statistics (ProjStat)	Block 4	7.5 ECTS
NMAK17001U	Causality	Block 4	7.5 ECTS
NMAA09045U	Finance 2: Dynamic Portfolio Research (Fin2)	Block 4	7.5 ECTS
NMAK15004U	Advanced Operations Research: Stochastic Programming	Block 4	7.5 ECTS
NMAK23002U	Computational Methods in Non-life Insurance	*Discontinued**	7.5 ECTS

* See discontinued courses below

**The course is not offered in the academic year 2024/25

5 Discontinued courses

Course code	Course title	ECTS	Interim arrangement
NDAK22002U	Advanced Deep Learning (ADL)	7.5	The course was a restricted elective subject element in the academic year 2023/24 and earlier. Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25
NMAK19004U	Advanced Topics in Modern Life Insurance	7.5	The course was a restricted elective subject element in the academic year 2021/22 and earlier. Offered for the last time: 2021/22 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23
NMAK19005U	Advances in Life Insurance Mathematics	7.5	The course was a restricted elective subject element in the academic year 2021/22 and earlier. Offered for the last time: 2021/22 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23
NMAK23002U	Computational Methods in Non-life Insurance	7.5	The course was a restricted elective subject element in the academic year 2023/24 and earlier. Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25

NMAK16006U	Consumption-Investment-Insurance Problems	7.5	The course was a restricted elective subject element in the academic year 2021/22 and earlier. Offered for the last time: 2018/19 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2019/20.
NMAA05025U	Econometrics 2: Statistical Analysis of Econometric Time Series (StatØ2)	7.5	The course was a restricted elective subject element in the academic year 2023/24 and earlier. Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25
NMAK22003U	Empirical bayes and generalized mixed linear Models	7.5	The course was a restricted elective subject element in the academic year 2023/24 and earlier. Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25
NMAK17005U	Machine Learning Methods in Non-Life Insurance	7.5	The course was a restricted elective subject element in the academic year 2021/22 and earlier. Offered for the last time: 2021/22 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.
NMAK22019U	Machine Learning Methods in Non-Life Insurance	7.5	The course was a restricted elective subject element in the academic year 2022/23 and 2021/22. Offered for the last time: 2022/23. Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2023/24.
NMAK23011U	Modeling and estimation for health and disability insurance	7.5	The course was a restricted elective subject element in the academic year 2023/24 and earlier. Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25
NMAK21012U	Pension Systems	7.5	The course was a restricted elective subject element in the academic year 2021/22 and earlier. Offered for the last time: 2021/22 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23

NMAA05117U	Stochastic Processes in Non-Life Insurance (SkadeStok)	7.5	The course was a compulsory subject element in the academic year 2023/24 and earlier. Offered for the last time: 2023/24. Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25. The course can be replaced by NMAK17007U Monte Carlo Methods in Insurance and Finance, 7.5 ECTS
NMAA06052U	Topics in Life Insurance (Liv2)	7.5	The course was a compulsory subject element in the academic year 2023/24 and earlier. Offered for the last time: 2023/24. The course has changed censorship from external to internal and is replaced by NMAK24013U Topics in Life Insurance (Liv2), 7.5 ECTS. Students admitted to the programme in the academic year 2023/24 or earlier must pass the exam with external censorship. The affected students will be contacted regarding this issue.

Appendix 3 Description of objectives for the thesis

After completing the thesis, the student should have:

Knowledge about:

- Scientific problems within the study programme's subject areas.
- A suitable combination of methodologies/theories based on international research for use in his/her work with the problem formulation.
- Theories/models on the basis of an organised value system and with a high degree of independence.

Skills in/to:

- Apply and critically evaluate theories/methodologies, including their applicability and limitations.
- Assess the extent to which the production and interpretation of findings/material depend on the theory/methodology chosen and the delimitation chosen.
- Discuss academic issues arising from the thesis.
- Draw conclusions in a clear and academic manner in relation to the problem formulation and, more generally, considering the topic and the subject area.
- Discuss and communicate the academic and social significance, if any, of the thesis based on ethical principles.

Competences in/to:

- Initiate and perform academic work in a research context.
- Solve complex problems and carry out development assignments in a work context.