



# Programme-specific Section of the Curriculum for the MSc Programme in Mathematics-Economics at the Faculty of Science, University of Copenhagen 2009 (Rev. 2024)

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## 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 Mathematics-Economics leads to a Master of Science (MSc) in Mathematics-Economics with the Danish title: *Cand.scient.oecon (candidatus/candidata scientiarum oeconomices)*.

### 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 Mathematics-Economics is a research-based interdisciplinary programme, the objective of which is to educate economists with a sound understanding of mathematics and statistics and the application of these disciplines within economic theory. Through a synthesis of the mathematical, statistical and economic fields of study, the mathematics-economist learns to handle theoretical and practical economic issues.

### 2.2 General programme profile

The study programme is an interdisciplinary programme offered by the Faculty of Science and the Faculty of Social Sciences with each faculty supplying a share of the compulsory courses. On the one hand, the study programme gives future economists with an interest in mathematics and statistics the opportunity to work with modern mathematical approaches and techniques. On the other hand, future mathematicians and statisticians obtain a good understanding of the areas of application of the economic subjects.

The programme's key subject areas are mathematics, statistics (including probability theory, data science and machine learning) and economics (including finance and operations research). Moreover, computer science is included in the programme as a subject.

### 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 Mathematics-Economics qualifies students to become professionals within business functions and/or areas such as:

- Work within the financial sector.
- Economist positions requiring good analytical skills and use of mathematics, statistics and IT.

- Work within the public administration.
- Work within the consulting sector.
- A PhD programme

### 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 courses and other study activities.

#### 3.1 Competence profile

Graduates holding an MSc in Mathematics-Economics have acquired the following:

##### Knowledge about:

- Selected research-active areas of economics and statistics, to a high level.
- Time-series analysis of financial data. Advanced macroeconomics with emphasis on monetary policy.

##### Skills in/to:

- Read and understand economic and statistical original literature.
- Communicate economic and mathematical issues on a scientific basis.
- Account orally and in writing for inquiries into open economic issues.

##### Competences in/to:

- Structure a study of open economic questions, especially of an econometric or finance-related nature and divide it into smaller easily accessible challenges.
- Further develop and adapt economic models for real-life challenges.
- Conduct independent, stringent argumentation.
- Independently take responsibility for the students own professional development and specialisation.
- Scientifically reflect on mathematical methods for analysing and resolving economic questions.

## 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 Mathematics-Economics:

- Mathematics-Economics (*matematik-økonomi*) 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 Mathematics-Economics if the programme includes the following:

- |  |                    |
|--|--------------------|
| • Subject elements in mathematical analysis  | at least 22.5 ECTS |
| • Subject elements in linear algebra   | at least 7.5 ECTS  |
| • Subject elements in microeconomics   | at least 15 ECTS   |
| • Subject elements in macroeconomics   | at least 15 ECTS   |
| • Subject elements in mathematical finance, equivalent in content to the course NMAA05076U <i>Finansiering 1</i> | at least 7.5 ECTS  |

- Subject elements in statistics on a measure theoretical basis at least 15 ECTS
- Subject elements in advanced probability at least 7.5 ECTS

**For informational purpose - Bachelor's degrees that have previously been assessed as qualifying meeting the specified ECTS**

Applicants with a Bachelor's degree in Actuarial Mathematics or Mathematics from University of Copenhagen are qualified for admission if the programme includes the following:

- Subject elements in microeconomics at least 15 ECTS
- Subject elements in macroeconomics at least 15 ECTS
- Subject elements in finance at least 7.5 ECTS
- Subject elements in statistics on a measure theoretical basis at least 15 ECTS
- Subject elements in advanced probability 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](http://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 programme 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 Mathematics-Economics from University of Copenhagen the student is granted reserved access and guaranteed a place on the MSc Programme in Mathematics-Economics 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 mathematics, statistics and economics.

## 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, 15 ECTS.
- Restricted elective subject elements, 45 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 (15 ECTS):

Course Code	Course Title	Abbr.	Block	ECTS
NMAK24011U	Financial Econometric Time Series Analysis	FinMetrics	Block 1	7.5 ECTS
NMAK10018U	Macroeconomics 3 – Business Cycles and Monetary Stabilization Policy		Block 2	7.5 ECTS

#### 6.1.2 Restricted elective subject elements

45 ECTS are to be covered as subject elements from the following list:

Course Code	Course Title	Block	ECTS
NMAK24001U	Mathematical Finance	Block 1+2	15 ECTS
NMAK24007U	Brownian Motion (BM)	Block 1	7.5 ECTS
NMAK24000U	Stochastic Processes in Continuous Time	Block 1	7.5 ECTS
NMAK24010U	Topics in Statistics	Block 1	7.5 ECTS
NMAK16005U	Computational Statistics	Block 1	7.5 ECTS
NMAK11022U	Regression (Reg)	Block 1	7.5 ECTS
NDAK15014U	Advanced Topics in Machine Learning	Block 1	7.5 ECTS
NDAK22000U	Machine Learning A (MLA)	Block 1	7.5 ECTS
NMAK22012U	Reserving in Non-Life Insurance	Block 1	7.5 ECTS
NMAK22001U	Consumption-Investment Problems*	Block 1	7.5 ECTS
NMAK22016U	Term Structure Models	Block 1	7.5 ECTS
NMAK19003U	Applied Probability	Block 1	7.5 ECTS
NMAA09044U	Operations Research 2: Advanced Operations Research (OR2)	Block 1	7.5 ECTS
NMAK16019U	Survival Analysis	Block 2	7.5 ECTS
NMAK13005U	Introduction to Extreme Value Theory (IntroExtremValue)	Block 2	7.5 ECTS
NMAK24004U	Risk Optimization	Block 2	7.5 ECTS
NMAK22008U	Point Processes	Block 2	7.5 ECTS
NMAK20003U	Statistics A (StatA)	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
NMAK23005U	Inference for Stochastic Differential Equations*	Block 2	7.5 ECTS
NIFK14001U	Microeconomic and Econometric Production Analysis	Block 2	7.5 ECTS
NIFK16001U	Economic Efficiency and Benchmarking	Block 2	7.5 ECTS
LOJK10229U	Natural Resource Economics	Block 2	7.5 ECTS
NMAK23003U	Convex Optimization, Complementarity and Equilibrium Modelling*	Block 2	7.5 ECTS
NMAK24009U	Topics in Probability	Block 2	7.5 ECTS
NIFK23003U	Market Design	Block 2	7.5 ECTS

<b>Course Code</b>	<b>Course Title</b>	<b>Block</b>	<b>ECTS</b>
NIFK23007U	Applied Trade and Climate Policy Models	Block 2	7.5 ECTS
NMAK19001U	Applied Operations Research	Block 2	7.5 ECTS
NMAK15010U	Continuous Time Finance 2 (FinKont2)	Block 3	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
NMAK22007U	Models for Complex Systems	Block 3	7.5 ECTS
NDAK21003U	Online and Reinforcement Learning (OReL)	Block 3	7.5 ECTS
NMAK23006U	Interpretable Machine Learning	Block 3	7.5 ECTS
LOJK10248U	Economic Valuation Methods and Cost-Benefit Analysis	Block 3	7.5 ECTS
NMAK24008U	Targeted Learning	Block 3	7.5 ECTS
NMAK10020U	Quantitative Risk Management (QRM)	Block 2	7.5 ECTS
NMAK15004U	Advanced Operations Research: Stochastic Programming	Block 4	7.5 ECTS
NMAK14028U	Project in Statistics	Block 4	7.5 ECTS
NMAK16004U	Computational Finance *	Block 4	7.5 ECTS
NDAK14007U	Applied Programming (APP)	Block 4	7.5 ECTS
NDAK24002U	Deep Learning	Block 2	7.5 ECTS
NMAA09045U	Finance 2: Dynamic Portfolio Choice (Fin2)	Block 2	7.5 ECTS
NMAK17001U	Causality	Block 4	7.5 ECTS
NDAK22001U	Machine Learning B (MLB)	Block 4	7.5 ECTS
NIFK23009U	Impact Evaluation	Block 4	7.5 ECTS
NIFK15003U	Applied Economics of Consumption	Block 4	7.5 ECTS
AØKA08230U	Financial Econometrics A	Autumn	7.5 ECTS
AØKA08239U	Health Economics	Autumn	7.5 ECTS
AØKA08245U	Finansiell Rapportering og Regnskabsanalyse (F)	Autumn	7.5 ECTS
AØKK08402U	Advanced Economics of the Environment and Climate Change	Autumn	7.5 ECTS
AØKK08201U	Mechanism Design	Autumn	7.5 ECTS
AØKA08084U	Advanced Microeconometrics	Autumn	7.5 ECTS
AØKA08204U	Fixed Income Derivatives: Risk Management and Financial Institutions (F)	Autumn	7.5 ECTS
AØKA08233U	Anvendt økonomisk modellering	Autumn	7.5 ECTS
AØKK08426U	Advanced Macroeconomics: Heterogeneous Agent Models	Autumn	7.5 ECTS
AØKK08398U	Advanced Financial and Macro Econometrics (F)	Spring	7.5 ECTS
AØKK08408U	Advanced Game Theory	Spring	7.5 ECTS
AØKA08223U	Economics of Exchanges Rates (F)	Spring	7.5 ECTS
AØKA08088U	Advanced Development Economics - Micro Aspects	Spring	7.5 ECTS
AØKA08021U	International Economics	Spring	7.5 ECTS
AØKK08095U	Pricing Financial Assets	Spring	7.5 ECTS
AØKA08073U	Regnskabsanalyse og aktievurdering	Spring	7.5 ECTS
AØKA08235U	Economics of the Environment and Climate Change	Spring	7.5 ECTS
AØKA08166U	Behavioral Finance (F)	Spring	7.5 ECTS
AØKA08231U	Kapitalmarkedsforhold (F)	Spring	7.5 ECTS
AØKA08225U	Applied Econometric Policy Evaluation (p)	Spring	7.5 ECTS
AØKK08407U	Advanced Empirical Finance: Topics and Data Science	Spring	7.5 ECTS
AØKK08396U	Financial Markets Microstructure (F)*	Spring	7.5 ECTS
AØKK08207U	Dynamic Programming – Theory, Computation, and Empirical Applications	Spring	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.
- All courses at Department of Economics SAMF are preapproved as elective courses.
- 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 Mathematics-Economics 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.

The principal supervisor can be from the Department of Economics, SAMF.

### **6.1.6 Academic mobility**

The curriculum makes it possible to follow subject elements outside the Faculty of Science.

For students admitted in September the academic mobility in the MSc Programme in Mathematics-Economics is placed in block 1+2 of the 2<sup>nd</sup> year.

For students admitted in February the academic mobility in the MSc Programme in Mathematics-Economics is placed in block 3+4 of the 2<sup>nd</sup> 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 Amendment**

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](http://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.

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

**Table - MSc Programme in Mathematics-Economics**

	Block 1	Block 2	Block 3	Block 4
1st year	Financial Econometric Time Series Analysis	Macroeconomics 3 – Business Cycles and Monetary Policy (MakØk3)	Restricted elective	Restricted elective
	Restricted elective	Restricted elective	Restricted elective	Restricted elective
2nd year	Elective	Elective	Thesis	
	Elective	Elective		

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

**Table - MSc Programme in Mathematics-Economics\***

	Block 3	Block 4	Block 1	Block 2
1st year	Restricted elective	Restricted elective	Financial Econometric Time Series Analysis	Macroeconomics 3 – Business Cycles and Monetary Policy (MakØk3)
	Restricted elective	Restricted elective	Restricted elective	Restricted elective
2nd year	Elective	Elective	Thesis	
	Elective	Elective		

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

## Appendix 2 Interim arrangements

The Shared Section of the BSc and MSc Curricula for Study Programmes 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.

The programme consists of the following:

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

#### Compulsory Subject elements

All of the following subject elements are to be covered (30 ECTS):

Course Code	Course Title	Abbr.	Block	ECTS
NMAA05025U	Econometrics 2: Statistical Analysis of Econometric Time Series	StatØ2	Discontinued*	7.5 ECTS
NMAK10018U	Macroeconomics 3 – Business Cycles and Monetary Stabilization Policy	MakØk3	Block 2	7.5 ECTS
NMAK22006U	Microeconomics 3 – Corporate Finance	MikØk3	Discontinued*	7.5 ECTS
NMAA09045U	Finance 2: Dynamic Portfolio Choice	Fin2	Block 2	7.5 ECTS

\* See discontinued courses below

#### Restricted elective subject elements

30 ECTS are to be covered by subject elements from the following list:

Restricted elective subject elements offered as part of this curriculum (see above)				
NMAA05117U	Stochastic Processes in Non-Life Insurance (SkadeStok)		Discontinued*	7.5 ECTS
NMAA05115U	Stochastic Processes in Life Insurance (LivStok)		Discontinued*	7.5 ECTS
NMAK11003U	Advanced Probability Theory 1 (VidSand1)		Discontinued*	7.5 ECTS
NMAK11011U	Advanced Probability Theory 2 (VidSand2)		Discontinued*	7.5 ECTS
NMAA05113U	Continuous Time Finance (FinKont)		Discontinued*	7.5 ECTS
AØKA08036U	Årsregnskab og regnskabsanalyse		Discontinued*	7.5 ECTS
AØKA08055U	Contract Theory		Discontinued*	7.5 ECTS
AØKA08243U	Energy Econometrics of the Green Transition		Autumn	7.5 ECTS
NMAA06052U	Topics in Life Insurance		Discontinued*	7.5 ECTS
NMAK23011U	Modeling and Estimation for Health and Disability Insurance		Discontinued*	7.5 ECTS
NDAK22002U	Advanced Deep Learning		Discontinued*	7.5 ECTS
NMAA06068U	Topics in Non-Life Insurance (Skade2)		Discontinued*	7.5 ECTS
NMAK22010U	Projects in the Mathematics of Life Insurance		Block 4	7.5 ECTS
NMAK22003U	Empirical Bayes and generalized linear mixed models		Discontinued*	7.5 ECTS
NMAK23002U	Computational Methods in Non-life Insurance		Discontinued*	7.5 ECTS
AØKA08069U	Economics of Banking		Discontinued*	7.5 ECTS
AØKA08020U	Industrial Organization		Discontinued*	7.5 ECTS

\* See discontinued courses below

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

Students admitted to the MSc programme in the academic year 2022/23 must finish the programme as listed in the curriculum above with the following exceptions.

The programme consists of the following:

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

### Compulsory Subject elements

All of the following subject elements are to be covered (30 ECTS):

Course Code	Course Title	Abbr.	Block	ECTS
NMAA05025U	Econometrics 2: Statistical Analysis of Econometric Time Series	StatØ2	Discontinued*	7.5 ECTS
NMAK10018U	Macroeconomics 3 – Business Cycles and Monetary Stabilization Policy	MakØk3	Block 2	7.5 ECTS
NMAK22006U	Microeconomics 3 – Corporate Finance	MikØk3	Discontinued*	7.5 ECTS
NMAA09045U	Finance 2: Dynamic Portfolio Choice	Fin2	Block 2	7.5 ECTS

\* See discontinued courses below

### Restricted elective subject elements

30 ECTS are to be covered by subject elements from the following list:

Restricted elective subject elements offered as part of this curriculum (see above)			
AØKA08082U	Advanced Industrial Organizations		Discontinued* 7.5 ECTS
AØKA08070U	Multivariant analyse og kategoriserede data		Autumn 7.5 ECTS
AØKA08208U	Praktisk tidsrækkeanalyse		Autumn 7.5 ECTS
AØKA08186U	Programmering og statistik med SAS		Spring 7.5 ECTS
AØKA08077U	Stikprøvetori		Spring 7.5 ECTS
AØKK08202U	Corporate Finance Theory		Autumn 7.5 ECTS
NMAA09044U	Operations Research 2: Advanced Operations Research (OR2)		Block 1 7.5 ECTS
NMAK22019U	Machine Learning Methods in Non-Life Insurance		Discontinued* 7.5 ECTS
NMAK22014U	Seminar in Statistics		Block 1 7.5 ECTS
NMAA05117U	Stochastic Processes in Non-Life Insurance (SkadeStok)		Discontinued* 7.5 ECTS
NMAA05115U	Stochastic Processes in Life Insurance (LivStok)		Discontinued* 7.5 ECTS
NMAK11003U	Advanced Probability Theory 1 (VidSand1)		Discontinued* 7.5 ECTS
NMAK11011U	Advanced Probability Theory 2 (VidSand2)		Discontinued* 7.5 ECTS
NMAA05113U	Continuous Time Finance (FinKont)		Discontinued* 7.5 ECTS
AØKA08036U	Årsregnskab og regnskabsanalyse		Discontinued* 7.5 ECTS
AØKA08055U	Contract Theory		Discontinued* 7.5 ECTS
AØKA08243U	Energy Econometrics of the Green Transition		Autumn 7.5 ECTS
NMAA06052U	Topics in Life Insurance		Discontinued* 7.5 ECTS
NMAK23011U	Modeling and Estimation for Health and Disability Insurance		Discontinued* 7.5 ECTS
NDAK22002U	Advanced Deep Learning		Discontinued* 7.5 ECTS
NMAA06068U	Topics in Non-Life Insurance (Skade2)		Discontinued* 7.5 ECTS
NMAK22010U	Projects in the Mathematics of Life Insurance		Block 4 7.5 ECTS
NMAK22003U	Empirical Bayes and generalized linear mixed models		Discontinued* 7.5 ECTS
NMAK23002U	Computational Methods in Non-life Insurance		Discontinued* 7.5 ECTS
AØKA08069U	Economics of Banking		Discontinued* 7.5 ECTS
AØKA08020U	Industrial Organization		Discontinued* 7.5 ECTS

\*See discontinued courses below

### 3 General changes for students admitted in the academic year 2021/22 or 2020/21

Students admitted to the MSc programme in the academic year 2021/22 and earlier must finish the programme as listed in the curriculum above with the following exceptions.

#### Compulsory subject elements

All the following subject elements are to be covered (30 ECTS)

NMAA05025U	Econometrics 2: Statistical Analysis of Econometric Time Series	StatØ2	Discontinued*	7.5 ECTS
NMAK10018U	Macroeconomics 3 – Business Cycles and Monetary Stabilization Policy	MakØk3	Block 2	7.5 ECTS
NMAK11020U	Microeconomics 3 – Industrial Organization	MikØk3	Discontinued*	7.5 ECTS
NMAA09045U	Finance 2: Dynamic Portfolio Choice	Fin2	Block 2	7.5 ECTS

\*See discontinued courses below

#### Restricted elective subject elements

30 ECTS are to be covered by subject elements from the following list:

Restricted elective subject elements offered as part of this curriculum (see above)				
NMAK16018U	Structural Equation Models*		Discontinued*	7.5 ECTS
NMAK17005U	Machine Learning Methods in Non-Life Insurance		Discontinued*	7.5 ECTS
AØKA08012U	Corporate Finance and Incentives		Discontinued*	7.5 ECTS
AØKA08079U	Health Economics		Discontinued*	7.5 ECTS
AØKA08091U	Økonomiske prognoser i praksis		Discontinued*	7.5 ECTS
AØKA08082U	Advanced Industrial Organizations		Discontinued*	7.5 ECTS
AØKA08070U	Multivariant analyse og kategoriserede data		Autumn	7.5 ECTS
AØKA08208U	Praktisk tidsrækkeanalyse		Autumn	7.5 ECTS
AØKA08186U	Programmering og statistik med SAS		Spring	7.5 ECTS
AØKA08077U	Stikprøvetori		Spring	7.5 ECTS
AØKK08202U	Corporate Finance Theory		Autumn	7.5 ECTS
NMAA09044U	Operations Research 2: Advanced Operations Research (OR2)		Block 1	7.5 ECTS
NMAK22019U	Machine Learning Methods in Non-Life Insurance		Discontinued*	7.5 ECTS
NMAK22014U	Seminar in Statistics		Block 1	7.5 ECTS
NMAA05117U	Stochastic Processes in Non-Life Insurance (SkadeStok)		Discontinued*	7.5 ECTS
NMAA05115U	Stochastic Processes in Life Insurance (LivStok)		Discontinued*	7.5 ECTS
NMAK11003U	Advanced Probability Theory 1 (VidSand1)		Discontinued*	7.5 ECTS
NMAK11011U	Advanced Probability Theory 2 (VidSand2)		Discontinued*	7.5 ECTS
NMAA05113U	Continuous Time Finance (FinKont)		Discontinued*	7.5 ECTS
AØKA08036U	Årsregnskab og regnskabsanalyse		Discontinued*	7.5 ECTS
AØKA08055U	Contract Theory		Discontinued*	7.5 ECTS
AØKA08243U	Energy Econometrics of the Green Transition		Autumn	7.5 ECTS
NMAA06052U	Topics in Life Insurance		Discontinued*	7.5 ECTS
NMAK23011U	Modeling and Estimation for Health and Disability Insurance		Discontinued*	7.5 ECTS
NDAK22002U	Advanced Deep Learning		Discontinued*	7.5 ECTS
NMAA06068U	Topics in Non-Life Insurance (Skade2)		Discontinued*	7.5 ECTS
NMAK22010U	Projects in the Mathematics of Life Insurance		Block 4	7.5 ECTS
NMAK22003U	Empirical Bayes and generalized linear mixed models		Discontinued*	7.5 ECTS
NMAK23002U	Computational Methods in Non-life Insurance		Discontinued*	7.5 ECTS
AØKA08069U	Economics of Banking		Discontinued*	7.5 ECTS
AØKA08020U	Industrial Organization		Discontinued*	7.5 ECTS

\*See discontinued courses below

#### 4 Discontinued courses

Course Code	Course Title	ECTS	Interim arrangement
AØKA08082U	Advanced Industrial Organizations	7.5	The course was a restricted elective course in the academic year 2022/23 and earlier.  Offered for the last time: 2022/23 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2023/24.
NDAK22002U	Advanced Deep Learning	7.5	The course was a restricted elective subject element in the academic year 2023/24 and 2022/23.  Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25
NMAK11003U	Advanced Probability Theory 1 (VidSand1)	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
NMAK11011U	Advanced Probability Theory 2 (VidSand2)	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
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
NMAA05113U	Continuous Time Finance (FinKont)	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.
AØKA08055U	Contract Theory	7.5	The course was a restricted elective course 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.

Course Code	Course Title	ECTS	Interim arrangement
AØKA08012U	Corporate Finance and Incentives	7.5	The course was a restricted elective course 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.
NMAA05025U	Econometrics 2: Statistical Analysis of Econometric Time Series (StatØ2)	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 is replaced by NMAK24011U Financial Econometric Time Series Analysis, 7.5 ECTS
AØKA08069U	Economics of Banking	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
AØKA08079U	Health Economics	7.5	The course was a restricted elective course 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.
AØKA08020U	Industrial Organization	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



<b>Course Code</b>	<b>Course Title</b>	<b>ECTS</b>	<b>Interim arrangement</b>
NMAK22006U	Microeconomics 3 – Corporate Finance	7.5	<p>The course was a compulsory subject element in the academic year 2023/24 and 2022/23.</p> <p>Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25</p> <p>The course is replaced by AØKK08202U Corporate Finance Theory (F), 7,5 ECTS.</p>
NMAK23011U	Modeling and estimation for health and disability insurance	7.5	<p>The course was a restricted elective subject element in the academic year 2023/24 and earlier.</p> <p>Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25</p>
NMAK17005U	Machine Learning Methods in Non-Life Insurance	7.5	<p>The course was restricted elective in the academic year 2021/22 and earlier.</p> <p>Offered for the last time: 2021/22 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.</p>
NMAK22019U	Machine Learning Methods in Non-Life Insurance	7.5	<p>The course was restricted elective in the academic year 2022/23.</p> <p>Offered for the last time: 2022/23 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2023/24.</p>
NMAK11020U	Microeconomics 3 – Industrial Organization	7.5	<p>The course was compulsory in the academic year 2021/22 and earlier.</p> <p>Offered for the last time: 2021/22 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.</p> <p>The course is replaced by NMAK22006U Microeconomics 3 – Corporate Finance (MikØk3)</p>
NMAA05115U	Stochastic Processes in Life Insurance (LivStok)	7.5	<p>The course was a restricted elective subject element in the academic year 2023/24 and earlier.</p> <p>Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25.</p>
NMAA05117U	Stochastic Processes in Non-Life Insurance (SkadeStok)	7.5	<p>The course was a restricted elective subject element in the academic year 2023/24 and earlier.</p> <p>Offered for the last time: 2023/24 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25.</p>



<b>Course Code</b>	<b>Course Title</b>	<b>ECTS</b>	<b>Interim arrangement</b>
NMAK16018U	Structural Equation Models	7.5	The course was restricted elective in the academic year 2021/22 and earlier.  Offered for the last time: 2020/21 Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2021/22.
NMAA06052U	Topics in 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
NMAA06068U	Topics in Non-Life Insurance (Skade2)	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.
AØKA08091U	Økonomiske prognoser i praksis	7.5	The course was a restricted elective course 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.
AØKA08036U	Årsregnskab og regnskabsanalyse	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.

## 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 the students 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.