



**Programme-specific Section of the
Curriculum for the MSc Programme in
Chemistry with a minor subject
at the Faculty of Science, University of Copenhagen
September 2013 (Rev. 2018)**

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1 Title, affiliation and language

A shared section that applies to all BSc and MSc Programmes at the Faculty of Science is linked to this programme-specific curriculum.

1.1 Title

The MSc Programme in Chemistry with a minor subject leads to a Master of Science (MSc) in Chemistry and minor in [the minor subject] with the Danish title: *Cand.scient. (candidatus/candidata scientiarum) i kemi med sidefag i [the minor subject]*.

It will appear from the diploma that the study programme has been completed as an MSc in two subjects and, provided that the requirements pertaining to the Upper Secondary School course packages (*gymnasiefagpakkerne*) have been met, that academic qualifications (*faglig kompetence*) for teaching at the Danish Upper Secondary School in the subjects have been achieved.

1.2 Affiliation

The programme is affiliated with the Study Board of Physics, Chemistry and Nanoscience, 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 Chemistry (*kemi*).

1.4 Language

The language of this MSc Programme is English.

2 Academic profile

2.1 Purpose

The objective of the programme is to provide the graduates with an in-depth knowledge within the methods and scientific basis of chemical research. The education is based on the competences the students have acquired during the MSc study programme. On completion of the programme, students will be able to perform research at advanced levels and analyse and solve questions and problems within the broad field of chemistry. A master's degree in chemistry equips the graduates with the necessary skills for participating in research groups or for the independent leadership and management of complex work and development situations within the field. The master's programme in Chemistry combines formal coursework with independent research guided by an experienced researcher.

2.2 General programme profile

The master's programme in chemistry is a research-based education. The master's programme in chemistry with a minor subject has an obligatory course in didactic. The graduate can choose between various partly elective courses covering most aspects of modern chemistry, such as organic chemistry, inorganic chemistry, computational chemistry and physical chemistry. Thus it is possible to create an individual academic profile.

Chemistry is the key subject area of the programme.

2.3 General structure of the programme

The MSc Programme is set at 120 or 150 ECTS depending on whether the minor subject is within the field of sciences or not.

Exercise and Sport Sciences is in this regard considered as being outside the field of science.

The MSc Programme in Chemistry with a minor subject consists of the following elements:

- Basic study program, 120 ECTS including the thesis.
- Extension of the minor subject, 30 ECTS, if the minor subject is outside the field of science.

There are no defined specialisations in this MSc Programme.

2.4 Career opportunities

The MSc Programme in Chemistry with a minor subject qualifies students to become professionals within business functions and/or areas such as:

- A PhD programme
- The private sector such as the pharmaceutical companies.
- High-tech companies.
- Consulting companies.
- The public sector.
- Universities.
- Sector Research Institute.
- Prerequisites for further studies, including a PhD program.

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

On completion of the programme, an MSc in Chemistry with a minor subject has acquired the following:

Knowledge about:

- Methods within selected areas and through independent work
- In-depth knowledge of an area of specialisation at an international level by conducting independent research and working under supervision.
- Learning theory and teaching theory relevant to science teaching in high school.

Skills in/to:

- Develop and implement a goal description for educational planning and implementation.
- Organise learning in informal environments in combination with learning in formal settings as well as analyse and resolve students' comprehension problems (alternative conceptions).
- Process and analyse data.
- Read and understand original academic literature in the field of chemistry.
- Use the subject's most important databases.
- Explain chemistry work, both orally and in writing.

Competences in/to:

- Designing, implementing, evaluating and reflecting on her/his own (and others') teaching of science in secondary education from selected theoretical considerations and arguments.

- Formulating, structuring and managing a research project involving the development and use of chemical methods.
- Managing complex work and development situations.
- Seeking out and summarising the available knowledge in a field of chemistry.
- Assessing chemical methods, and their application and limitations.
- Discussing chemistry's methods, theory and results, both in general and on a scientific level.
- Discussing the application of chemical results in an industrial, social and ethical context in an academic manner.
- Taking independent responsibility for own academic development and specialization.

4 Admission requirements

With a Bachelor's degree in Chemistry from the University of Copenhagen the student is granted reserved access and guaranteed a place on the MSc Programme in Chemistry with a minor subject if the student applies before the application deadline during the first application period after the completion of the Bachelor's degree.

The admission requirements for the MSc Programme in Biology with a minor subject is the same as the admission requirements listed in paragraph 4 in "Programme-specific Section of the Curriculum for the MSc Programme in Chemistry" supplemented with the following:

- At least 105 ECTS from the Upper Secondary School course package (*gymnasiefagpakken*) are included in the BSc programme.
- At least 45 ECTS from the minor subject is included in the BSc programme.
 - If the minor subject is *within* the field of sciences (with the exception of Exercise and Sport Sciences) the 45 ECTS must be contained in the minor subject Upper Secondary School course package (*den reducerede gymnasiefagpakke*).

5 Prioritisation of applicants

If the number of qualified applicants to the programme exceeds the number of places available the applicants will be prioritised according to paragraph 5 in "Programme-specific Section of the Curriculum for the MSc Programme in Chemistry".

6 Structure of the programme

The compulsory subject elements, restricted elective subject elements and the thesis constitute the central parts of the programme (Section 21 of the Ministerial Order on Bachelor and Master's Programmes (Candidatus) at Universities).

6.1 Programme components

The programme is set at 120/150 ECTS and consists of the following:

- Compulsory subject elements, 7.5 ECTS.
- Restricted elective subject elements, 37.5 ECTS
- The minor subject
 - 45 ECTS (minor subject within the field of science).
 - 75 ECTS (minor subject outside the field of science).
- Thesis, 30 ECTS

6.1.1 Compulsory subject elements within the major subject

All of the following subject elements are to be covered (7.5 ECTS):

• NNDK15000U	Naturfagsdidaktik for Biologi (DidBio)	Blok 1	7.5 ECTS
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6.1.2 Restricted elective subject elements within the major subject

37.5 ECTS are to be covered as subject elements from one or both of the following lists:

1) Up to 15 ECTS in BSc subject elements from the following list, must be followed, if they were not passed as part of the BSc programme:

• NKEA60002U	Kemiske undervisningsforsøg (KUF)	Block 3	7.5 ECTS
• NDIA10001U	Grundkursus i de naturvidenskabelige fags didaktik (DidG)	Block 4	7.5 ECTS

2) The remaining credits (up to 37.5 ECTS) are to be covered by subject elements from the following list (thesis full time and part time):

• NKEA09010U	Scientific writing, planning and presentation	Block 1	7.5 ECTS
• NKEK13018U	Advanced Photochemistry	Block 1	7.5 ECTS
• NKEK13007U	Reaction and synthesis in Medicinal Chemistry	Block 1+2	15 ECTS
• NKEA07016U	Computational Chemistry	Block 1+2	15 ECTS
• NKEK11002U	Atmospheric Environmental Chemistry	Block 2	7.5 ECTS
• NKEA09012U	Air Pollution and Health	Block 2	7.5 ECTS
• NKEK10004U	Advanced Physical Chemistry	Block 3+4	15 ECTS
• NKEK15004U	Descriptive Inorganic Chemistry	Block 3+4	15 ECTS
• NKEK13006U	Organic Chemistry	Block 3+4	15 ECTS

6.1.3 Restricted elective subjects within the minor subject

45 ECTS are to be covered as subject elements from the minor subject if the minor subject is within the field of science.

75 ECTS are to be covered as subject elements from the minor subject if the minor subject is outside the field of science.

If the student lacks less than 45 or 75 ECTS of the minor subject when the MSc Programme begins the difference must be covered as elective subject elements.

6.1.4 Elective subject elements

The elective subjects are generally covered by the subject elements which the student follows on the minor subject.

It is, however, possible to release elective subjects if the academic minimum requirements for the minor subjects have been met – this will, e.g., be the case if one or both of the following two conditions are present:

- A subject elements forms part of both the major and minor Upper Secondary School course packages (*gymnasiefagpakker*). The subject element should only be passed once, and the student has full freedom of choice in terms of the remaining ECTS.
- If less than 45 or 75 ECTS within the minor subject are missing when entering the MSc Programme.

BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme as elective subjects elements.

Projects outside the course scope may be included in the elective section of the programme by 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 by up to 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.

6.1.5 Thesis

The MSc Programme in Chemistry with a minor subject includes a thesis corresponding to 30 ECTS (full time), as described in Appendix 2 to the shared curriculum. The thesis must be written full time and the topic of the thesis must be within the academic scope of the programme.

The MSc Programme in Chemistry with a minor subject includes a thesis corresponding to 30 ECTS (part time), as described in Appendix 2 to the shared curriculum. The thesis must be written in parallel with other courses and the topic of the thesis must be within the academic scope of the programme.

6.1.6 Academic mobility

The academic mobility is generally covered by the subject elements which the student follows on the minor subject.

The student has the possibility to arrange academic mobility during the programme according to rules and regulations regarding pre-approvals and credit.

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 Tables

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

Table – MSc Programme in Chemistry with a minor subject within SCIENCE (thesis, full time)

	Block 1	Block 2	Block 3	Block 4
1st year	Minor subject	Minor subject	Minor subject	Minor subject
	Minor subject	Minor subject	Restricted elective	Restricted elective
2nd year	Naturfagsdidaktik for Biologi	Restricted elective	Thesis	
	Restricted elective	Restricted elective		

Compulsory
 Restricted elective
 Elective
 | The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.

Table – MSc Programme in Chemistry with a minor subject within SCIENCE (thesis, part time)

	Block 1	Block 2	Block 3	Block 4
1st year	Minor subject	Minor subject	Minor subject	Minor subject
	Minor subject	Minor subject	Restricted elective	Restricted elective
2nd year	Naturfagsdidaktik for Biologi	Restricted elective	Restricted elective	Restricted elective
	Thesis			

Compulsory
 Restricted elective
 Elective
 | The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.

Table – MSc Programme in Chemistry with a minor subject outside SCIENCE (thesis, full time)

	Block 1	Block 2	Block 3	Block 4
1st year	Minor subject	Minor subject	Minor subject	Minor subject
	Minor subject	Minor subject	Minor subject	Minor subject
2nd year	Naturfagsdidaktik for Biologi	Restricted elective	Minor subject	Minor subject
	Restricted elective	Restricted elective	Restricted elective	Restricted elective
3rd year	Thesis			

Compulsory
 Restricted elective
 Elective
 | The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules. Note that minor subjects outside SCIENCE may have a fixed progression.

Table – MSc Programme in Chemistry with a minor subject outside SCIENCE (thesis, part time)

	Block 1	Block 2	Block 3	Block 4
1st year	Minor subject	Minor subject	Minor subject	Minor subject
	Minor subject	Minor subject	Minor subject	Minor subject
2nd year	Naturfagsdidaktik for Biologi	Restricted elective	Minor subject	Minor subject
	Restricted elective	Restricted elective	Thesis	
3rd year	Restricted elective	Restricted elective		
	Thesis			







 Compulsory	 Restricted elective	The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules. Note that minor subjects outside SCIENCE may have a fixed progression.
 Elective		

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

Table – MSc Programme in Chemistry with a minor subject within SCIENCE (thesis, full time)*




	Block 3	Block 4	Block 1	Block 2
1st year	Minor subject	Minor subject	Minor subject	Minor subject
	Minor subject	Restricted elective	Naturfagsdidaktik for Biologi	Minor subject
2nd year	Restricted elective	Restricted elective	Thesis	
	Restricted elective	Restricted elective		

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

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

Table – MSc Programme in Chemistry with a minor subject within SCIENCE (thesis, part time)*

	Block 3	Block 4	Block 1	Block 2
1st year	Minor subject	Minor subject	Minor subject	Minor subject
	Restricted elective	Restricted elective	Minor subject	Minor subject
2nd year	Restricted elective	Restricted elective	Naturfagsdidaktik for Biologi	Restricted elective
	Thesis			

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

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

Table – MSc Programme in Chemistry with a minor subject outside SCIENCE (thesis, full time)*

	Block 3	Block 4	Block 1	Block 2
1st year	Minor subject	Minor subject	Minor subject	Minor subject
	Minor subject	Minor subject	Minor subject	Minor subject
2nd year	Minor subject	Minor subject	Naturfagsdidaktik for Biologi	Restricted elective
	Restricted elective	Restricted elective	Restricted elective	Restricted elective
3rd year	Thesis			

Compulsory	Restricted elective	The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules. Note that minor subjects outside SCIENCE may have a fixed progression.
	Elective	

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

Table – MSc Programme in Chemistry with a minor subject outside SCIENCE (thesis, part time)*

	Block 3	Block 4	Block 1	Block 2
1st year	Minor subject	Minor subject	Minor subject	Minor subject
	Minor subject	Minor subject	Minor subject	Minor subject
2nd year	Minor subject	Minor subject	Naturfagsdidaktik for Biologi	Restricted elective
	Restricted elective	Restricted elective	Thesis	
3rd year	Restricted elective	Restricted elective		
	Thesis			

Compulsory	Restricted elective	The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules. Note that minor subjects outside SCIENCE may have a fixed progression.
	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 2015/16 or 2016/2017

Students admitted to the MSc Programme in the academic year 2015/16 or 2016/2017 must finish the programme as listed in the curriculum above with the following exceptions.

Structure of the programme

The programme is set at 120/150 ECTS and consists of the following:

- Restricted elective subject elements, 45 ECTS
- The minor subject
 - 45 ECTS (minor subject within the field of science).
 - 75 ECTS (minor subject outside the field of science).
- Thesis, 30 ECTS

Restricted elective subject elements within the major subject

45 ECTS are to be covered as subject elements from one or both of the following lists:

1) Up to 15 ECTS in BSc subject elements from the following list, must be followed, if they were not passed as part of the BSc programme:

• NKEA60002U	Kemiske undervisningsforsøg (KUF)	Block 3	7.5 ECTS
• NDIA10001U	Grundkursus i de naturvidenskabelige fags didaktik (DidG)	Block 4	7.5 ECTS

2) The remaining credits (up to 45 ECTS) are to be covered by subject elements from the following list (thesis full time and part time):

• Restricted elective subject elements offered as part of list 2) in the curriculum (see above)			
• NKEK12006U	Surface Physical Chemistry	Block 3	7.5 ECTS
• NKEA08006U	Heterocyclic Chemistry	Block 3	7.5 ECTS
• NKEK13020U	Quantum Chemistry of Molecules Electromagnetic Properties	Block 3	7.5 ECTS
• NKEK13009U	Protein Structure and Function	Block 4	7.5 ECTS
• NKEK13019U	Molecular Electronic Theory	Block 4	7.5 ECTS
• NKEA07017U	Group Theory and its Application in Chemistry	Discontinued*	7.5 ECTS
• NKEK13021U	Sustainable Chemistry	Discontinued*	15 ECTS
Up to 7.5 ECTS can be covered as subject element from the following list			
• NNDK15001U	Naturfagsdidaktik for Fysik (DidFys)	Block 1	7.5 ECTS
• NNDK15000U	Naturfagsdidaktik for Biologi (DidBio)	Block 1	7.5 ECTS
• NNDK15002U	Geografiens Didaktik	Block 1	7.5 ECTS

*See specific course change in the table below

1.2 General changes for students admitted in the academic year 2014/15 or earlier

Students admitted to the MSc Programme in the academic year 2014/15 or earlier must finish the programme as listed in the curriculum above with the following exceptions.

Structure of the programme

For students admitted to the MSc programme in the academic year 2014/15 or earlier the programme consists of the following:

- Restricted elective subject elements within the major subject, 45 ECTS.
- Restricted elective subject elements within the minor subject, 45 or 75 ECTS.
- Thesis, 30 ECTS.

Restricted elective subject elements within the major subject

45 ECTS are to be covered by subject elements from the following lists:

At least 15 ECTS are to be covered by subject elements from the following list:

• NKEA07016U	Computational Chemistry	Block 1+2	15 ECTS
• NKEK10004U	Advanced Physical Chemistry	Block 3+4	15 ECTS
• NKEK15004U	Descriptive Inorganic Chemistry	Block 3+4	15 ECTS
• NKEK13006U	Organic Chemistry	Block 3+4	15 ECTS

Up to 15 ECTS in BSc subject elements from the following list, if they were not passed as part of the BSc programme:

• NKEA06002U	Kemiske undervisningsforsøg	Block 3	7.5 ECTS
• NDIA10001U	Grundkursus i de naturvidenskabelige fags didaktik	Block 4	7.5 ECTS

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

• NPLK13004U	Advanced Analytical Chemistry	Block 2	7.5 ECTS
• NPLK13003U	Advanced Analytical Chemistry - Sampling and Sample Preparation	Block 1	7.5 ECTS
• NKEK13018U	Advanced Photochemistry	Block 1	7.5 ECTS
• NKEK10004U	Advanced Physical Chemistry	Block 3+4	15 ECTS
• NKEK11003U	Advanced Synthetic Techniques	Block 5	7.5 ECTS
• NKEA09012U	Air Pollution and Health	Block 2	7.5 ECTS
• NKEK11002U	Atmospheric Environmental Chemistry	Block 2	7.5 ECTS
• NKEA07016U	Computational Chemistry	Block 1+2	15 ECTS
• NKEA06015U	Crystallography	Block 2	7.5 ECTS
• NKEA08006U	Heterocyclic Chemistry	Block 3	7.5 ECTS
• NKEK15004U	Descriptive Inorganic Chemistry	Block 3+4	15 ECTS
• NKEK13019U	Molecular Electronics Theory	Block 4	7.5 ECTS
• NKEK13006U	Organic Chemistry	Block 3+4	15 ECTS
• NKEK13009U	Protein Structure and Function	Block 4	7.5 ECTS
• NKEK13007U	Reactions and Synthesis in Medicinal Chemistry	Block 1+2	15 ECTS
• NKEA09010U	Scientific writing planning and presentation	Block 1	7.5 ECTS
• NKEK12006U	Surface Physical Chemistry	Block 3	7.5 ECTS
• NKEK13020U	Quantum Chemistry of Molecular Electromagnetic Properties	Block 3	7.5 ECTS
• NKEA07017U	Group Theory and its Application in Chemistry	Cancelled*	7.5 ECTS
• NKEK13021U	Sustainable Chemistry	Cancelled*	15 ECTS

*See specific course change in the table below

2 Course specific changes

Discontinued course	Interim arrangement
Group Theory and its Application in Quantum Chemistry (NKEA07017U), 7,5 ECTS	The course was a restricted elective course in the academic year 2015/16 and earlier. The course was offered for the last time in the academic year 2016/17 and a third exam has been offered in the academic year 2017/18.
Inorganic Chemistry (NKEK13010U), 15 ECTS	The course was a restricted elective course in the academic year 2014/15 or earlier. The course was offered for the last time in the academic year 2014/15 and a third exam has been offered in the academic year 2015/16. The course has changed title and is equivalent to Descriptive Inorganic Chemistry (NKEK15004U), 15 ECTS.
Sustainable Chemistry (NKEK13021U), 7.5 ECTS	The course was a restricted elective course in the academic year 2016/17 and earlier. The course was offered for the last time in the academic year 2016/17 and a third exam has been offered in the academic year 2017/18.

Appendix 3 Description of objectives for the thesis

After completing the thesis, the student should have:

Knowledge of:

- Appropriate methods within selected areas in chemistry of active research.
- Selected areas in chemistry at an international level by conducting independent research and working under supervision.

Skills in/to:

- Read and understand original academic literature in the field of chemistry.
- Explain chemistry work, both orally and in writing.
- Identify, define and formulate the scientific issue/impact of a research project.
- Define and develop testable hypotheses.
- Process and analyse data.

Competences in/to:

- Formulating, structuring and managing a research project involving the development and use of chemical methods.
- Managing complex work and development situations.
- Seeking out and summarising the available knowledge in selected areas of chemistry.
- Assessing chemical methods, and their application and limitations.
- Discussing chemical methods, theory and results, both in general and on a scientific level.
- Discussing the application of chemical results in an industrial, social and ethical context in an academic manner.
- Taking independent responsibility for own academic development and specialisation.