**Specialization at the Master’s degree in Nanoscience**

An academic specialization corresponding to 40 ECTS must be included in the Master’s degree program in Nanoscience.

You can choose from the following four specializations:

**Nanomaterials**

**Biomedical Nanotechnology**

**Structural Biology and Biophysics**

**Organic Nanochemistry/Soft Matter**

Every specialization consist of one or more specific courses and a choice of courses from a list for each specific specialization.

All specializations includes the course *Trends in Nanoscience – Communication and Entrepreneurship*.

Students, who will be on a university exchange programme for one of two semesters, will not have to follow the formal requirements for the specialization.

The specialization leaves 20 ECTS for optional courses at the Mater’s degree programme. Here you can follow (i) additional courses from the specialization, (ii) courses from a list of suggested elective courses in relation to the specializations, or (iii) other courses. It is possible to do an individual project of 5 or 10 ECTS or a business project (10 ECTS project in collaboration with a company). If so, this will be included as an elective course.

The master’s program in Nanoscience does not initially provide teaching competence in upper secondary school. However, there are several alumni who have taken that path anyway, typically after supplementation of subject-specific courses. If you would like to ease this process, there may be appropriate elective courses not mentioned in this document. If you are interested in this direction, it is recommended to discuss it with the head of degree programme when selecting courses.

The collective choice of courses at the Master’s degree programme must be included in the Master’s degree contract and it must be approved by the head of the Nanoscience programme.

In connection with each of the four specializations, there is a recommendation regarding elective courses on the Bachelor’s degree programme, which will be appropriate to follow before the specialization. The recommendations typically comprise more than the 20 ECTS points on the Bachelor’s degree programme, and you can therefore choose between the recommended courses based on your interest. Some courses in the specialization will require that that you have taken certain elective courses during the Bachelor’s degree programme.

On the following pages, tables list the course information for the four specializations together with the recommended elective courses on the Bachelor’s degree programme. The detailed course descriptions can be found in the [course catalogue](http://kursuskatalog.au.dk/en/). You can look up the course name or filter by provider or semester. Also, the tables on the following pages contain links to most of the courses. 5 ECTS courses runs for 14 weeks unless a quarter (Q) is indicated in the table

Please bear in mind, that the list was composed before the course catalogue was finalized. By inconsistency, the information in the course catalogues is valid.

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| **Recommended optional courses at the Bachelor’s degree programme for the four specializations** | | | |
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| **Course title** | **ECTS** | **Semester** | **Provider** |
|  |  |  |  |
| **Nanomaterials** |  |  |  |
|  |  |  |  |
| [Materials Chemistry I](https://kursuskatalog.au.dk/en/course/126674/Materials-Chemistry-I) | 10 | Fall | Chem |
| [Electrodynamics](https://kursuskatalog.au.dk/en/course/124085/Electrodynamics) | 10 | Spring | Phys |
| [Surface and Semiconductor-Physics](https://kursuskatalog.au.dk/en/course/121865/Surface-and-Semiconductor-Physics) \*From 2024: changed to Spring semester | 10 | Spring | Phys |
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| **Biomedical Nanotechnology** |  |  |  |
|  |  |  |  |
| [Metabolism - Concepts and Design](https://kursuskatalog.au.dk/en/course/124107/Metabolismens-koncepter-og-design) | 10 | Spring | MolBio |
| [Materials Chemistry I](https://kursuskatalog.au.dk/en/course/126674/Materials-Chemistry-I) | 10 | Fall | Chem |
| [Molecular Processes in the Cell](https://kursuskatalog.au.dk/en/course/126719/Molecular-Processes-in-the-Cell) | 10 | Fall | MolBio |
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| **Structural Biology and Biophysics** |  |  |  |
|  |  |  |  |
| [Molecular Biophysical Chemistry](https://kursuskatalog.au.dk/en/course/126676/Molecular-Biophysical-Chemistry) | 10 | Fall | Chem |
| [Structural Chemistry IIa: Spectroscopy in Organic Chemistry](https://kursuskatalog.au.dk/en/course/123797/Structural-Chemistry-IIa-Spectroscopy-in-Organic-Chemistry) | 5 | Spring | Chem |
| [Structural Chemistry IIb: Biophysical Chemistry](https://kursuskatalog.au.dk/en/course/123793/Structural-Chemistry-IIb-Biophysical-Chemistry) | 5 | Spring | Chem |
| [Structural Chemistry IIc: Chemical Crystallography](https://kursuskatalog.au.dk/en/course/123750/Structural-Chemistry-IIc-Chemical-Crystallography) | 5 | Spring | Chem |
| [Proteins and their Interactions](https://kursuskatalog.au.dk/en/course/123819/Proteins-and-their-Interactions) | 10 | Spring | MolBio |
| [Modelling IIa: Drug Design and Bioinformatics](https://kursuskatalog.au.dk/en/course/123957/Modelling-IIa-Drug-Design-and-Bioinformatics) | 10 | Spring | Chem |
|  |  |  |  |
| **Organic Nanochemistry/Soft Matter** |  |  |  |
|  |  |  |  |
| [Structural Chemistry I](https://kursuskatalog.au.dk/en/course/126679/Structural-Chemistry-I) | 5 | Fall | Chem |
| [Analytical Chemistry](https://kursuskatalog.au.dk/en/course/126669/Analytical-Chemistry) | 5 | Fall | Chem |
| [Organic Chemistry II: Reaction Mechanisms](https://kursuskatalog.au.dk/en/course/123824/Organic-Chemistry-II-Reaction-Mechanisms) | 10 | Spring | Chem |
| [Structural Chemistry IIa: Spectroscopy in Organic Chemistry](https://kursuskatalog.au.dk/en/course/123797/Structural-Chemistry-IIa-Spectroscopy-in-Organic-Chemistry) | 5 | Spring | Chem |
| [Structural Chemistry IIb: Biophysical Chemistry](https://kursuskatalog.au.dk/en/course/123793/Structural-Chemistry-IIb-Biophysical-Chemistry) | 5 | Spring | Chem |
| [Polymer Chemistry](https://kursuskatalog.au.dk/en/course/123822/Polymer-Chemistry) | 10 | Spring | Eng |

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| **Nanomaterials** |  | |  | |  | |
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|  |  | |  | |  | |
| **Course title** | **ECTS** | | **Semester** | | **Provider** | |
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| **Recommended optional courses at the Bachelor’s degree programme** |  | |  | |  | |
|  |  | |  | |  | |
| [Materials Chemistry I](https://kursuskatalog.au.dk/en/course/126674/Materials-Chemistry-I) | 10 | | Fall | | Chem | |
| [Electrodynamics](https://kursuskatalog.au.dk/en/course/124085/Electrodynamics) | 10 | | Spring | | Phys | |
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| **Specializing at the Master’s degree programme** |  | |  | |  | |
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| **The following must be included in the specialization** |  | |  | |  | |
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| [Trends in Nanoscience - Communication and Entrepreneurship](https://kursuskatalog.au.dk/en/course/123847/Trends-in-Nanoscience-Communication-and-Entrepreneurship) | 10 | | Spring | | iNANO | |
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| **In combination with at least 30 ECTS from the list below** |  | |  | |  | |
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| [Surface and Semiconductor-Physics](https://kursuskatalog.au.dk/en/course/121865/Surface-and-Semiconductor-Physics) \*From 2024: changed to Spring semester | 10 | | Spring | | Phys | |
| [Materials Chemistry IIId: Synchrotron and Neutron Science](https://kursuskatalog.au.dk/en/course/123958/Materials-Chemistry-IIId-Synchrotron-and-Neutron-Science) | 10 | | Spring | | Chem | |
| [Cleanroom-based Micro and Nano Fabrication](https://kursuskatalog.au.dk/en/course/127166/Cleanroom-based-Micro-and-Nano-Fabrication) | 5 | | Fall Q1 | | iNANO | |
| [Biomaterials](https://kursuskatalog.au.dk/en/course/127164/Biomaterials) | 5 | | Fall Q2 | | iNANO | |
| [Materials Chemistry IIIa: Physical Solid State Chemistry](https://kursuskatalog.au.dk/en/course/126721/Materials-Chemistry-IIIa-Physical-Solid-State-Chemistry) | 10 | | Fall | | Chem | |
| [Solid State Physics II](https://kursuskatalog.au.dk/en/course/124594/Solid-State-Physics-II) | 10 | | Spring | | Phys | |
| [Advanced Statistical Physics](https://kursuskatalog.au.dk/en/course/120831/Advanced-Statistical-Physics) \*Not conducted 2024 | 5 | | Fall | | Phys | |
| [Materials Chemistry IIIb: Advanced Crystallography](https://kursuskatalog.au.dk/en/course/126816/Materials-Chemistry-IIIb-Advanced-Crystallography) | 10 | | Fall | | Chem | |
| [Materials Chemistry IIIc: Solid State NMR](https://kursuskatalog.au.dk/en/course/126817/Materials-Chemistry-IIIc-Solid-State-NMR) | 10 | | Fall | | Chem | |
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| **Recommended optional courses in relation to this specialization** |  | |  | |  | |
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| [Lasers & Optics](https://kursuskatalog.au.dk/en/course/123839/Lasers-Optics) | 10 | | Spring | | Phys | |
| [Techniques in Experimentel Physics](https://kursuskatalog.au.dk/en/course/127601/Teknikker-i-eksperimentel-fysik) | 10 | | Fall | | Phys | |
| [Organic Chemistry IIIc: Electrochemistry and Organic Surface Chemistry](https://kursuskatalog.au.dk/en/course/126818/Organic-Chemistry-IIIc-Electrochemistry-and-Organic-Surface-Chemistry) | 10 | | Fall | | Chem | |
| [Polymer Chemistry](https://kursuskatalog.au.dk/en/course/123822/Polymer-Chemistry) | 10 | | Spring | | Eng | |
| [Advanced Polymers and Nanomaterials](https://kursuskatalog.au.dk/en/course/127419/Advanced-Polymers-and-Nanomaterials) | 10 | | Fall | | Eng | |
| [Physical Chemistry IIIb: Soft Matter and Scattering Methods](https://kursuskatalog.au.dk/en/course/120925/Physical-Chemistry-IIIb-Soft-Matter-and-Scattering-Methods) \*Not conducted 2024 | 10 | | Fall | | Chem | |
| [Structural Chemistry IIc: Chemical Crystallography](https://kursuskatalog.au.dk/en/course/123750/Structural-Chemistry-IIc-Chemical-Crystallography) | 5 | | Spring | | Chem | |
| [Materials Chemistry II: Experimental Materials Chemistry](https://kursuskatalog.au.dk/en/course/126675/Materials-Chemistry-II-Experimental-Materials-Chemistry) | 10 | | Fall | | Chem | |
| [Introduction to Programming with Scientific Applications](https://kursuskatalog.au.dk/en/course/123832/Introduction-to-Programming-with-Scientific-Applications) | 10 | | Spring | | CS | |
| [Atmospheric Chemistry](https://kursuskatalog.au.dk/en/course/123769/Atmospheric-Chemistry) | 10 | | Spring | | Chem | |
| [Application of Synchrotron Radiation in Nanoscience](https://kursuskatalog.au.dk/en/course/118186/Application-of-Synchrotron-Radiation-in-Nanoscience) \*Not conducted 2024 | 5 | | Summer | | iNANO | |
| [Individual Project in Nanoscience (5-10 ECTS)](https://kursuskatalog.au.dk/en/course/124788/Individual-Project-in-Nanoscience-10-ECTS) | 5-10 | | Fall/Spring | | iNANO | |
| [Business Project in Nanoscience](https://kursuskatalog.au.dk/en/course/124781/Business-Project-in-Nanoscience) | 10 | | Fall/Spring | | iNANO | |
| **Biomedical Nanotechnology** | |  | |  | |  | |
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| **Course title** | | **ECTS** | | **Semester** | | **Provider** | |
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| **Recommended optional courses at the Bachelor’s degree programme** | |  | |  | |  | |
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| [Metabolism - Concepts and Design](https://kursuskatalog.au.dk/en/course/124107/Metabolismens-koncepter-og-design) | | 10 | | Spring | | MolBio | |
| [Materials Chemistry I](https://kursuskatalog.au.dk/en/course/126674/Materials-Chemistry-I) | | 10 | | Fall | | Chem | |
| [Molecular Processes in the Cell](https://kursuskatalog.au.dk/en/course/126719/Molecular-Processes-in-the-Cell) | | 10 | | Fall | | MolBio | |
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| **Specializing at the Master’s degree programme** | |  | |  | |  | |
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| **The following must be included in the specialization** | |  | |  | |  | |
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| [Trends in Nanoscience - Communication and Entrepreneurship](https://kursuskatalog.au.dk/en/course/123847/Trends-in-Nanoscience-Communication-and-Entrepreneurship) | | 10 | | Spring | | iNANO | |
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| **In combination with at least 10 ECTS from the list below** | |  | |  | |  | |
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| [Nanomedicine](https://kursuskatalog.au.dk/en/course/127289/Nanomedicine) | | 5 | | Fall Q1 | | iNANO | |
| [Cleanroom-based Micro and Nano Fabrication](https://kursuskatalog.au.dk/en/course/127166/Cleanroom-based-Micro-and-Nano-Fabrication) | | 5 | | Fall Q1 | | iNANO | |
| [Biomaterials](https://kursuskatalog.au.dk/en/course/127164/Biomaterials) | | 5 | | Fall Q2 | | iNANO | |
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| **And minimum 20 ECTS from the list below** | |  | |  | |  | |
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| [Molecular Processes in the Cell](https://kursuskatalog.au.dk/en/course/126719/Molecular-Processes-in-the-Cell) | | 10 | | Fall | | MolBio | |
| [Cell Biology in Health, Ageing and Disease](https://kursuskatalog.au.dk/en/course/124555/Cell-Biology-in-Health-Ageing-and-Disease) | | 10 | | Spring | | MolBio | |
| [Biomolecular Design and Nanotechnology](https://kursuskatalog.au.dk/en/course/127165/Biomolecular-Design-and-Nanotechnology) | | 10 | | Fall | | iNANO | |
| [Molecular Microbiology](https://kursuskatalog.au.dk/en/course/124829/Molecular-Microbiology) | | 10 | | Spring | | Biology | |
|  | |  | |  | |  | |
| **Recommended optional courses in relation to this specialization** | |  | |  | |  | |
|  | |  | |  | |  | |
| [Surface and Semiconductor-Physics](https://kursuskatalog.au.dk/en/course/121865/Surface-and-Semiconductor-Physics) \*From 2024: changed to Spring semester | | 10 | | Spring | | Phys | |
| [Physical Chemistry IIIb: Soft Matter and Scattering Methods](https://kursuskatalog.au.dk/en/course/120925/Physical-Chemistry-IIIb-Soft-Matter-and-Scattering-Methods) \*Not conducted 2024 | | 10 | | Fall | | Chem | |
| [Nanoscale Bioimaging and Single Molecule Biophysics](https://kursuskatalog.au.dk/en/course/124780/Nanoscale-Bioimaging-and-Single-Molecule-Biophysics) | | 10 | | Spring | | iNANO | |
| [Medicinal Chemistry I: Drug Discovery and Drug Delivery](https://kursuskatalog.au.dk/en/course/123800/Medicinal-Chemistry-I-Drug-Discovery-and-Drug-Delivery) | | 10 | | Spring | | Chem | |
| [Medicinal Chemistry II: Chemical Biology](https://kursuskatalog.au.dk/en/course/124093/Medicinal-Chemistry-II-Chemical-Biology) | | 10 | | Spring | | Chem | |
| [Modelling IIa: Drug Design and Bioinformatics](https://kursuskatalog.au.dk/en/course/123957/Modelling-IIa-Drug-Design-and-Bioinformatics) | | 10 | | Spring | | Chem | |
| [Polymer Chemistry](https://kursuskatalog.au.dk/en/course/123822/Polymer-Chemistry) | | 10 | | Spring | | Eng | |
| [Human Physiology](https://kursuskatalog.au.dk/en/course/124105/Human-Physiology) | | 10 | | Spring | | Biomedicine | |
| [Individual Project in Nanoscience (5-10 ECTS)](https://kursuskatalog.au.dk/en/course/124788/Individual-Project-in-Nanoscience-10-ECTS) | | 5-10 | | Fall/Spring | | iNANO | |
| [Business Project in Nanoscience](https://kursuskatalog.au.dk/en/course/124781/Business-Project-in-Nanoscience) | | 10 | | Fall/Spring | | iNANO | |

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| **Structural Biology and Biophysics** |  |  |  |
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| **Course title** | **ECTS** | **Semester** | **Provider** |
|  |  |  |  |
| **Recommended optional courses at the Bachelor’s degree programme** |  |  |  |
|  |  |  |  |
| [Molecular Biophysical Chemistry](https://kursuskatalog.au.dk/en/course/126676/Molecular-Biophysical-Chemistry) | 10 | Fall | Chem |
| [Structural Chemistry IIa: Spectroscopy in Organic Chemistry](https://kursuskatalog.au.dk/en/course/117545/Structural-Chemistry-IIa-Spectroscopy-in-Organic-Chemistry) | 5 | Spring | Chem |
| [Structural Chemistry IIb: Biophysical Chemistry](https://kursuskatalog.au.dk/en/course/117546/Structural-Chemistry-IIb-Biophysical-Chemistry) | 5 | Spring | Chem |
| [Structural Chemistry IIc: Chemical Crystallography](https://kursuskatalog.au.dk/en/course/117831/Structural-Chemistry-IIc-Chemical-Crystallography) | 5 | Spring | Chem |
| [Proteins and their Interactions](https://kursuskatalog.au.dk/en/course/118188/Proteins-and-their-Interactions) | 10 | Spring | MolBio |
| [Modelling IIa: Drug Design and Bioinformatics](https://kursuskatalog.au.dk/en/course/117702/Modelling-IIa-Drug-Design-and-Bioinformatics) | 10 | Spring | Chem |
|  |  |  |  |
| **Specializing at the Master’s degree programme** |  |  |  |
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| **The following must be included in the specialization** |  |  |  |
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| [Trends in Nanoscience - Communication and Entrepreneurship](https://kursuskatalog.au.dk/en/course/118194/Trends-in-Nanoscience-Communication-and-Entrepreneurship) | 10 | Spring | iNANO |
|  |  |  |  |
| **In combination with at least 30 ECTS from the list below** |  |  |  |
|  |  |  |  |
| [Biomolecular Design and Nanotechnology](https://kursuskatalog.au.dk/en/course/127165/Biomolecular-Design-and-Nanotechnology) | 10 | Fall | iNANO |
| [Nanoscale Bioimaging and Single Molecule Biophysics](https://kursuskatalog.au.dk/en/course/124780/Nanoscale-Bioimaging-and-Single-Molecule-Biophysics) | 10 | Spring | iNANO |
| [Modelling IIa: Drug Design and Bioinformatics](https://kursuskatalog.au.dk/en/course/117702/Modelling-IIa-Drug-Design-and-Bioinformatics) | 10 | Spring | Chem |
| [Materials Chemistry IIIc: Solid State NMR](https://kursuskatalog.au.dk/en/course/126817/Materials-Chemistry-IIIc-Solid-State-NMR) | 10 | Fall | Chem |
| [Bio-Molecular Structure Determination](https://kursuskatalog.au.dk/en/course/117691/Bio-Molecular-Structure-Determination) | 10 | Spring | MolBio |
|  |  |  |  |
| **Recommended optional courses in relation to this specialization** |  |  |  |
|  |  |  |  |
| [RNA Molecular Biology](https://kursuskatalog.au.dk/en/course/117695/RNA-Molecular-Biology) | 10 | Spring | MolBio |
| [Physical Chemistry IIIb: Soft Matter and Scattering Methods](https://kursuskatalog.au.dk/en/course/120925/Physical-Chemistry-IIIb-Soft-Matter-and-Scattering-Methods) \*Not conducted 2024 | 10 | Fall | Chem |
| [Physical Chemistry II: Reaction Dynamics](https://kursuskatalog.au.dk/en/course/126672/Physical-Chemistry-II-Reaction-Dynamics) | 10 | Fall | Chem |
| [Individual Project in Nanoscience (5 or 10 ECTS)](https://kursuskatalog.au.dk/en/course/124788/Individual-Project-in-Nanoscience-10-ECTS) | 5-10 | Fall/Spring | iNANO |
| [Business Project in Nanoscience](https://kursuskatalog.au.dk/en/course/124781/Business-Project-in-Nanoscience) | 10 | Fall/Spring | iNANO |

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| **Organic Nanochemistry/Soft Matter** |  |  |  |
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| **Course title** | **ECTS** | **Semester** | **Provider** |
|  |  |  |  |
| **Recommended optional courses at the Bachelor’s degree programme** |  |  |  |
|  |  |  |  |
| [Structural Chemistry I](https://kursuskatalog.au.dk/en/course/126679/Structural-Chemistry-I) | 5 | Fall | Chem |
| [Analytical Chemistry](https://kursuskatalog.au.dk/en/course/126669/Analytical-Chemistry) | 5 | Fall | Chem |
| [Organic Chemistry II: Reaction Mechanisms](https://kursuskatalog.au.dk/en/course/117544/Organic-Chemistry-II-Reaction-Mechanisms) | 10 | Spring | Chem |
| [Structural Chemistry IIa: Spectroscopy in Organic Chemistry](https://kursuskatalog.au.dk/en/course/117545/Structural-Chemistry-IIa-Spectroscopy-in-Organic-Chemistry) | 5 | Spring | Chem |
| [Structural Chemistry IIb: Biophysical Chemistry](https://kursuskatalog.au.dk/en/course/117546/Structural-Chemistry-IIb-Biophysical-Chemistry) | 5 | Spring | Chem |
| [Polymer Chemistry](https://kursuskatalog.au.dk/en/course/117711/Polymer-Chemistry) | 10 | Spring | Eng |
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| **Specializing at the Master’s degree programme** |  |  |  |
|  |  |  |  |
| **The following must be included in the specialization** |  |  |  |
|  |  |  |  |
| [Trends in Nanoscience - Communication and Entrepreneurship](https://kursuskatalog.au.dk/en/course/118194/Trends-in-Nanoscience-Communication-and-Entrepreneurship) | 10 | Spring | iNANO |
|  |  |  |  |
| **In combination with at least 30 ECTS from the list below** |  |  |  |
|  |  |  |  |
| [Organic Chemistry IIIa: Experimental Organic Synthesis](https://kursuskatalog.au.dk/en/course/126677/Organic-Chemistry-IIIa-Experimental-Organic-Synthesis) | 10 | Fall | Chem |
| [Organic Chemistry IIlb: Physical Organic Chemistry](https://kursuskatalog.au.dk/en/course/126678/Organic-Chemistry-IIlb-Physical-Organic-Chemistry) | 10 | Fall | Chem |
| [Medicinal Chemistry I: Drug Discovery and Drug Delivery](https://kursuskatalog.au.dk/en/course/118193/Medicinal-Chemistry-I-Drug-Discovery-and-Drug-Delivery) | 10 | Spring | Chem |
|  |  |  |  |
| [Proteins and their Interactions](https://kursuskatalog.au.dk/en/course/118188/Proteins-and-their-Interactions) | 10 | Spring | MolBio |
| [Advanced Polymers and Nanomaterials](https://kursuskatalog.au.dk/en/course/127419/Advanced-Polymers-and-Nanomaterials) | 10 | Fall | Eng |
| [Physical Chemistry IIIb: Soft Matter and Scattering Methods](https://kursuskatalog.au.dk/en/course/120925/Physical-Chemistry-IIIb-Soft-Matter-and-Scattering-Methods) \*Not conducted 2024 | 10 | Fall | Chem |
|  |  |  |  |
| **Recommended optional courses in relation to this specialization** |  |  |  |
|  |  |  |  |
| [Organic Chemistry IIIc: Electrochemistry and Organic Surface Chemistry](https://kursuskatalog.au.dk/en/course/126818/Organic-Chemistry-IIIc-Electrochemistry-and-Organic-Surface-Chemistry) | 10 | Fall | Chem |
| [Organic Chemistry IV: Bioorganic Chemistry](https://kursuskatalog.au.dk/en/course/126819/Organic-Chemistry-IV-Bioorganic-Chemistry) | 10 | Fall | Chem |
| [Medicinal Chemistry II: Chemical Biology](https://kursuskatalog.au.dk/en/course/117477/Medicinal-Chemistry-II-Chemical-Biology) | 10 | Spring | Chem |
| [Individual Project in Nanoscience (5 or 10 ECTS)](https://kursuskatalog.au.dk/en/course/124788/Individual-Project-in-Nanoscience-10-ECTS) | 5-10 | Fall/Spring | iNANO |
| [Business Project in Nanoscience](https://kursuskatalog.au.dk/en/course/120765/Business-Project-in-Nanoscience) | 10 | Fall/Spring | iNANO |