

## 2009 curriculum provisions for the Master of Science Programme in Pharmaceutical Sciences at the Faculty of Health and Medical Sciences, University of Copenhagen

These curriculum provisions come into force on September 1, 2015, and apply to students admitted to the programme since September 1, 2009.

The curriculum provisions were approved by the Dean in May 2009 with changes approved in March 2014, August 2015, August 2016, March 2017, March 2018, March 2019, March 2020, March 2022, March 2023, March 2024, March 2025 and March 2026.

This subject-specific curriculum, the course or module descriptions in the overall University of Copenhagen course database and the general curriculum provisions together comprise the curriculum for the degree of Master of Science (MSc) in Pharmaceutical Sciences.

### Part 1 Objectives and qualification profile

#### § 1 Objectives

The objectives of the Master of Science in Pharmaceutical Sciences programme are:

- To enhance the student's academic knowledge and ability, and to increase the theoretical and methodological qualifications together with the independency acquired by the student on a bachelor programme in the natural, health or technical sciences on the basis of the highest international research within this field.
- To educate the students in becoming pharmaceutical experts who are capable of identifying, formulating and solving complex pharmaceutical problems independently and at an academic level.
- To provide the student with a considerable degree of academic depth through the application of basic and advanced academic elements from within the pharmaceutical disciplines and methods, and training in scientific work and methods that develop the student's ability to work in related jobs in the industry.
- To qualify the student to continue his or her studies, possibly at PhD level.

Successful completion of the programme gives the right to use the title of kandidat i lægemiddelvidenskab (cand.scient. i lægemiddelvidenskab) and the English title of Master of Science (MSc) in Pharmaceutical Sciences.

1.2. The programme is worth 120 ECTS credits.

1.3. The programme belongs under the Study Board for the Pharmaceutical Sciences.

1.4. The programme belongs under the corps of external examiners for pharmaceutical degree programmes in Denmark.

## § 2 Admission requirements

2.1. There are no bachelor's degrees that give legal right of admission to the MSc in Pharmaceutical Sciences. To qualify for admission to the programme, applicants must:

1. Have completed a bachelor programme in the health, natural or technical sciences and meet the admission requirements in biological and chemical disciplines. In the bachelor's degree, the applicant must have accumulated:
2. At least 120 ECTS credits in chemical and/or biological disciplines.
3. At least 15 ECTS credits in biochemistry and/or molecular biology and/or microbiology.
4. At least 15 ECTS credits in chemistry subjects, of which at least 7.5 ECTS credits must be in organic chemistry.
5. Applicants must submit a document certifying English skills equivalent to Danish secondary school 'English level B' with a weighted average of 3 (Danish grading scale) or 'English level A' with a weighted average of 2 (Danish grading scale) or one of the following language tests: International English Language Testing System (IELTS/Academic) or the Test of English as a Foreign Language (TOEFL).

1. IELTS-test (British Council) with a minimum score of 6.5
2. Paper-based TOEFL-test with a minimum score of 560 points
3. Internet-based TOEFL-test with a min score of 83 points
4. Passed Cambridge English Certificate: Advanced (CAE) – level C1
5. Applicants with a degree from an English taught qualifying upper secondary school diploma, bachelor's degree or master's degree from USA, Canada, Australia, New Zealand, UK or Ireland are exempted from the language requirement.

2.2. The requirements for admission stipulated in 2.1. above must be met before commencing on the programme.

2.3. The bachelor's degree in question must have been gained no more than five years before commencement of the first semester of the programme.

2.4. In special circumstances the admissions panel may waive the requirements stipulated in 2.1 and 2.3.

2.5. List of Danish bachelor's degrees known to the University of Copenhagen where the above criteria can be met:

- Bachelor's degree in Biochemistry at University of Copenhagen and Bachelor's degree in Biochemistry as a specialization under Molecular Biology at Aarhus University
- Bachelor's degree in Molecular Biology at Aarhus University and Roskilde University
- Bachelor's degree in Biomedicine at University of Southern Denmark
- Bachelor's degree in Biochemistry and Molecular Biology at University of Southern Denmark
- Bachelor's degree in Biology with minors in chemistry at University of Southern Denmark
- Bachelor's degree in Molecular Biomedicine at University of Copenhagen and Aarhus University

- Bachelor's degree in Chemistry at University of Copenhagen, Aarhus University, Roskilde University, Aalborg University and University of Southern Denmark
- Bachelor's degree in Pharmacy at University of Copenhagen
- Bachelor's degree in Engineering in Biotechnology at Technical University of Denmark
- Bachelor's degree in Engineering (Chemical Engineering and Biotechnology) at Aalborg University
- Bachelor's degree in Engineering in Human Life Sciences and Engineering at Technical University of Denmark
- Bachelor's degree in Medicinal Chemistry at University of Copenhagen, Aarhus University, and University of Southern Denmark
- Bachelor's degree in Medicine with Industrial Specialization at Aalborg University

2.6. 50 students may be admitted per annum.

2.7. One third of the seats may be reserved for students from countries outside of the EU/EEA.

### **§ 3 Competency profile**

#### **3.2. Knowledge**

A graduate with an MSc in the Pharmaceutical Sciences:

- Has knowledge at the highest international level in the key academic disciplines of drug discovery, development, production and application.
- Can understand the chief multi-disciplinary processes and relationships between the main phases of drug development on the basis of knowledge of the individual academic disciplines.
- Has, regardless of programme speciality, broad knowledge of pharmacology and physiology, medicinal chemistry, the formulation and production of pharmaceuticals and related disciplines. Also understands and is able to reflect over the correlation between these disciplines in relation to how drugs ultimately influence disease in humans, and how complex biosystems influence drugs in the widest sense.
- Can understand and identify scientific problems in the areas of drug discovery, development, production and application in society.
- Has knowledge of the national and international regulatory requirements as well as the quality standards set for the drug development process on the whole.

#### **3.3. Skills**

A graduate with an MSc in the Pharmaceutical Sciences:

Masters key scientific experimental methods related to academic disciplines: quantitative analysis of data, complex mathematical calculations, scientific reporting including assessing and discussing experimental or collected data, a critical approach to literature in the field, quality assurance and knowledge of the requirements that general and scientific ethics place on these methods in terms of drug development.

Based on interdisciplinary understanding is able to propose and formulate model solutions and methods of analysis to solve multidimensional problems in the areas of drug discovery, development, production and application.

Is able to present, communicate and discuss interdisciplinary knowledge and drug-related problems with colleagues, other specialists and non-specialists.

### **3.4. Competences**

A graduate with an MSc in the Pharmaceutical Sciences:

Is able to assess complex problems in the areas of drug discovery, development, production and application, and on the basis of interdisciplinary skills is able to formulate hypotheses and model solutions, either independently or in interdisciplinary collaboration.

Can independently take responsibility for continuing to develop within an interdisciplinary environment as well as area of specialisation: drug discovery or development, medicine and society.

Is able to make a constructive contribution to collaboration or lead multidisciplinary project groups in certain phases of drug development or in connection with communication between the pharmaceutical industry and health authorities based on area of specialisation.

In an interdisciplinary area can integrate complex information and think analytically, creatively, innovatively and reflectively in order to solve problems in the areas of drug discovery, industry and public authorities.

## **Part 2 Programme structure, instruction and maximum duration of study**

### **§ 4 Programme structure and instruction**

The programme consists of a number of compulsory modules, a compulsory academic study track, a number of restricted elective and elective modules and a master's thesis.

The modules compulsory for all students are as follows:

1. Drug Discovery and Development (7.5 ECTS credits)
2. Principles of Pharmacology (7.5 ECTS credits)
3. Pharmaceutics and Drug Development (7.5 ECTS credits)

One of the three academic study tracks listed below:

Study track I ("Drug Discovery"):

- Medicinal and Biostructural Chemistry (7.5 ECTS credits)
- Pharmacology: From Physiology to Therapy (15 ECTS credits)
- Advances in Medicinal Chemistry Research (7.5 ECTS credits)

Study track II ("Drug Development"):

- Medicinal and Biostructural Chemistry (7.5 ECTS credits)
- Pharmaceutical Analytical Chemistry (7.5 ECTS credits)
- Research Project in Pharmaceutics and Drug Delivery (15 ECTS credits)

Study track III (Clinical Operations and Regulatory Affairs):

- Pharmacology: From Physiology to Therapy (15 ECTS credits)

- Regulatory Science (7.5 ECTS credits)
- Methods and Procedures in Clinical Drug Development (7.5 ECTS credits)

A master's thesis worth 30, 37.5, 45, 52.5 or 60 ECTS credits within a pharmaceutically relevant field.

Restricted elective modules amounting to at most 37,5 ECTS credits.

Other elective modules amounting to at most 30 ECTS credits.

4.2. The constituent subject elements in the programme is constituted by the compulsory study and exam activities, and the Master's thesis. These elements consist of part 1 no. 1, 2, 3, 4, 5 and 6 and must amount to at least 90 ECTS credits.

4.3. Each student's syllabus must be drawn up in cooperation with the thesis supervisor to ensure that:

1. There is a reasonable connection and progression between the completed bachelor programme and the master's programme.
2. The student has acquired the academic foundation necessary to complete the chosen master's thesis.
3. The master's programme to be followed incorporates optimal academic progression.
4. The programme comprises a balanced course of study aimed at one or more areas of employment

4.4. Instruction is primarily in the form of lectures, dialog-based class teaching, experimental exercises and project work in groups of two or more students.

## § 5 Maximum duration of study

Students admitted to the programme 1. September 2016 or later must complete the programme within three years of commencement. Students admitted to the programme before the date must complete the programme within four years of commencement.

5.2. The study board may extend this deadline in special circumstances.

## Part 3 Course modules and exams

### § 6

The programme contains the following course modules and exams:

Block 1+2 (1<sup>st</sup> year): Compulsory course modules and exams, including ECTS

Course title and code	Course certificate and code	ECTS	Exam and code	ECTS
<u>Drug Discovery and Development</u> SLVKB0392U			Exam in: Drug Discovery and Development SLVKB0392E	7,5
<u>Principles of Pharmacology</u> SLVKB0352U			Exam in: Principles of Pharmacology SLVKB0352E	7,5

Course title and code	Course certificate and code	ECTS	Exam and code	ECTS
<u>Pharmaceutics and Drug Development</u> SMPS20004U	Course in: Pharmaceutics and Drug Development		Exam in: Pharmaceutics and Drug Development	
<u>Study track I + II:</u> <u>Medicinal and Biostructural Chemistry</u> SFAK24001U			Exam in: Medicinal and Biostructural Chemistry SFAK24001E	7,5
<u>Study track III:</u> <u>Methods and Procedures in Clinical Drug Development</u> SMPS20003U			Exam in: Methods and Procedures in Clinical Drug Development SMPS20003E	7,5

Block 3+4 (1<sup>st</sup> year): Compulsory course modules and exams, including ECTS

Course title and code	Course certificate and code	ECTS	Exam and code	ECTS
<u>Study track I + III:</u> <u>Pharmacology:</u> <u>From Physiology to Therapy</u> SLVKB0362U			Exam in: Pharmacology: From Physiology to Therapy SLVKB0362E	15
<u>Study track II:</u> <u>Pharmaceutical Analytical Chemistry</u> SMPS20006U	Course in: Pharmaceutical Analytical Chemistry SMPS20006E	2,5	Exam in: Pharmaceutical Analytical Chemistry SMPS20007E	5
<u>Study track II:</u> Restrictive elective-/ <u>Elective modules</u>				
<u>Study track I:</u> <u>Advances in Medicinal Chemistry Research</u> <u>SLKKIL110U</u>			Exam in: Advances in Medicinal Chemistry Research <u>SLKKIL110E</u>	7,5
<u>Study track II:</u> <u>Research Project in Pharmaceutics and Drug Delivery</u> <u>SLVKA0342U</u>			Exam in: Research Project in Pharmaceutics and Drug Delivery	15
<u>Study track III:</u> <u>Regulatory Science</u> SFAK25008U  SFAK25008UU			Exam in:  Regulatory Science SFAK25008E	7,5
<u>Study track I + III:</u> Restrictive elective-/ <u>Elective modules</u>				

Block 1+2+3+4 (2<sup>nd</sup> year): Compulsory course modules and exams, including ECTS

Course title and code	Course certificate and code	ECTS	Exam and code	ECTS
Restrictive elective-/ <u>Elective modules</u>				
And/or <u>Individualized study unit</u>				
And/or <u>master's thesis</u> SPECIALENG				30, 37.5, 45, 52.5 or 60

## § 7

The programme must include the following elements:

7.2. Compulsory course and exam activities of 52.5 ECTS (§8). Elective course and exam modules of maximum 30 ECTS (§11).

7.3. Restrictive course and exam modules of minimum 7,5 ECTS (§11).

7.4. The programme includes 30 – 60 ECTS credits for the master's thesis (§12).

## § 8 Group exams

Where the course description permits students to complete an assignment together, the submitted assignment must clearly identify the contribution made by each student in order to enable individual assessment.

## § 9 Instruction and exam language

Instructions and exams are in English.

## § 10 Elective element

To complete the programme students must take an elective course element worth between 7.5 and 37.5 ECTS credits (see 4.1 above). This element may be taken as a module prior to or in parallel with the master's thesis.

10.2. The study board must ensure that the student has access to at least 18 elective courses each worth 7.5 or 15 ECTS credits offered in block 1 to 4. The elective courses are described in the course database, where they will be announced no later than May 1 for the following study year.

10.3. The elective course descriptions must be approved by the study board no later than a year before the course is held.

10.4. The study board offers the elective courses in accord with the objectives of the programme, see § 1.1 above.

10.5. An independent research paper or report or similar worth 7.5, 15, 22.5 or 30 ECTS credits may be completed in accordance with the course description for *Individualised Study Unit* (STADS code: ITSEKABA11).

10.6. If fewer than 15 students sign up for a module it may be cancelled.

10.7. Students who are refused enrolment on an oversubscribed or cancelled module will be given a new deadline to sign up for modules with vacant places.

### **§ 11 Master's thesis**

The student normally prepares a master's thesis during the third and fourth semesters.

The thesis demonstrates the student's ability to formulate, analyse and process problems within a relevant, limited scientific subject in the pharmaceutical sciences in a qualified fashion.

11.2. The Master thesis may be prepared individually or by two students working together.

11.3. The thesis must be written in English and in accordance with the approved thesis contract. The thesis must be accompanied by an abstract in English of no more than one A4 page. The abstract must summarize problem formulation, methods used, significant results/findings, a discussion when relevant and a conclusion. The abstract will be included in the overall assessment of the Master's thesis. The rules are covered in detail in the course module description.

11.4. When assessing bachelor projects, master's (candidatus) theses, master's project and other major written assignments, emphasis must, in addition to the academic content, also be placed on the student's spelling and writing skills.

11.5. The Master project is worth 30, 37.5, 45, 52.5 or 60 ECTS credits.

## **Part 4 Specific provisions**

### **§ 12 Transitional arrangements**

These are determined by the study board and can be found [here](#).

Stk. 2. General changes for students admitted in the academic year 2019/20.

Students admitted to the MSc Programme in the academic year 2019/20 must finish the programme as listed in the curriculum above with the following exceptions:

- Medicinal and Biostructural Chemistry (compulsory): Passed SFAK18004U course certificate, 0 ECTS and SFAK18004E written exam, 7,5 ECTS is equivalent to passed SFAK18004U course certificate, 2,5 ECTS and SFAK18004E written exam, 5 ECTS.
- Pharmaceutical Analytical Chemistry (compulsory in track II/elective track I and III): Passed SLVKA0361E written exam, 7,5 ECTS is equivalent to passed SLVKA0361U course certificate 2,5 ECTS and SLVKA0361E written exam, 5.
- Biopharmaceuticals: Protein Production and Analysis (elective): Passed SFKK18007E written exam, 7,5 ECTS is equivalent to passed SFKK18007U course certificate, 2,5 ECTS and SFKK18007E written exam, 5 ECTS.
- Principles and Practice of Bioanalysis (elective): Passed SFKK18003E written exam, 7,5 ECTS is equivalent to passed SFKK18003U course certificate, 2,5 ECTS and SFKK18003E written exam, 5 ECTS.

Stk. 3. General changes for students admitted before the academic year 2022/23.

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

SMPS20038U Contemporary Social Pharmacy (compulsory): Passed SMPS20038U course certificate, 7,5 ECTS is equivalent to passed SMPS20038E oral exam, 7,5 ECTS.

Stk. 4 General changes for students admitted in and before the academic year 2023/2024:

SFAK20010U/E Medicinal and Biostructural Chemistry: Passed SFAK20010E course certificate, 2.5 ECTS credits and SFAK20011E written exam, 5 ECTS are equivalent to passed SFAK24001U/E Medicinal Biostructural Chemistry, 7.5 ECTS.

Students who have participated in the course SFAK20010U Medicinal and Biostructural Chemistry but have not passed the course certificate SFAK20010E of 2.5 ECTS, must participate in the course SFAK24001U/E Medicinal Biostructural Chemistry, 7.5 ECTS.

Students who have participated in the course SFAK20010U Medicinal and Biostructural Chemistry before 1 September 2024, who have passed the course certificate SFAK20010E 2.5 ECTS, but have not passed the written exam SFAK20011E, 5 ECTS, must take the exam offered in the following periods:

- Ordinary winter exams 2024
- Winter reexam 2024/25
- Ordinary winter exams 2025

Stk 5 General changes applicable to students admitted in the academic year 2024 or earlier:

The exam in the restricted elective course *Contemporary Social Pharmacy SMPS22003E* (7.5 ECTS) will be discontinued from the academic year 2026-2027.

The exam in *Contemporary Social Pharmacy* will be offered the following three times:

- Ordinary summer exams 2025
- Summer reexam 2025
- Ordinary summer exams 2026

The course in *Contemporary Social Pharmacy SMPS22003E in study track III* will be replaced with the course Regulatory Science SFAK20044U.

The restricted elective course Advanced Manufacturing of Pharmaceuticals (SFAK20002E, 7.5 ECTS) will be discontinued from the academic year 2026-2027.

The exam in Advanced Manufacturing of Pharmaceuticals will be offered in the following three sessions:

- Ordinary winter exam 2024-25
- Winter reexam 2024-25

- Ordinary winter exam 2025-26

The restricted elective course Intellectual Property Rights and Innovation in Pharmaceutical Sciences (SFAK20040E, 7.5 ECTS) will be discontinued from the academic year 2026-2027. The exam in course Intellectual Property Rights and Innovation in Pharmaceutical Sciences will be offered in the following three sessions:

- Ordinary summer exam 2025
- Summer reexam 2025
- Ordinary summer exam 2026

The elective course *Entrepreneurship in Pharmaceuticals* (SFAK20007E, 7.5 ECTS) will be discontinued from the academic year 2026-2027.

The exam in *Entrepreneurship in Pharmaceuticals* will be offered in the following three sessions:

- Ordinary summer exam 2025
- Summer reexam 2025 Ordinary summer exam 2026

The restricted elective course Biopharmaceuticals: Design and Modification of Biomacromolecules SMPS20001U changes exam format from a written assignment to an on-site written exam applicable to the study year 2026-2027.

The exam in Biopharmaceuticals: Design and Modification of Biomacromolecules SMPS20002E with the old exam format will be offered the following three times:

- Ordinary winter exam 2024-25
- Winter reexam 2024-25
- Ordinary winter exam 2025-26

Students admitted in the academic year 2024 or earlier can choose to take the exam in Biopharmaceuticals: Design and Modification of Biomacromolecules SMPS20002E with the new exam format.

The elective course Regulatory Science SFAK20044U changes exam format from continuous assessment to a written assignment applicable to the study year 2026-2027.

The exam in Regulatory Science SFAK20044E with the old exam format will be offered the following three times:

- Ordinary summer exam 2025
- Summer reexam 2025
- Ordinary Summer exam 2026

Students admitted in the academic year 2024 or earlier can choose to take the exam in Regulatory Science SFAK25008E with the new exam format.

The restricted elective course Drug Delivery to the Central Nervous System (CNS), SFKKIF103E (7.5 ECTS), changes its exam format from a written on site exam to an oral exam (10 minutes without aids). Effective from the 2026–2027 academic year.

The exam in Drug Delivery to the Central Nervous System (CNS), SFKKIF103E, will be offered with the previous exam format during the following three exam periods:

- Ordinary summer exam 2026
- Summer re exam 2026
- Ordinary summer exam 2027

Students admitted in the 2025 academic year or earlier, who are or have been registered for the course but have not yet passed SFKKIF103E, may choose to take the exam in Drug Delivery to the Central Nervous System (CNS), SFKKIF103E, using the new exam format.

### **§ 13 Academic study track**

In the first semester students must choose an academic study track. Until the commencement of block 2 of the first semester students may change their study track of choice.

## **Part 5 Concluding remarks**

### **§ 14 Exemptions from these provisions**

In exceptional circumstances, the study board may grant exemptions from any curriculum provisions within the sole remit of the study board.

### **§ 15 Date of commencement**

These curriculum provisions come into force on September 1<sup>st</sup> 2018 and apply to students admitted to the programme since September 1<sup>st</sup> 2018.