Teaching and Examination Regulations 2021-2022 Master´s degree programmes Medical Pharmaceutical Sciences

Appendix I Learning outcomes of the degree programme (art. 3.1)

A graduate Medical Pharmaceutical Sciences (MPS) is able to:

1 Explain in detail the major underlying principles within the field of Medical and Pharmaceutical Sciences and integrate knowledge of etiology and pathophysiology of disease to design and develop more effective and safer drugs (knowledge).

2 Identify new developments within the field of Medical Pharmaceutical Sciences and can become familiar with these developments (Lifelong learning skills)

3 Critically appraise the results of research in 'medical pharmaceutical sciences' and/or in the dedicated specialisms 'drug toxicology and translational technology', 'pharmaceutical design and engineering' or 'pharmacoepidemiology and pharmacoeconomics' (knowledge and judgement).

4 Formulate hypotheses, design and conduct scientific research, manage and interpret data and demonstrate proficiency in statistical analyses for Medical Pharmaceutical Sciences (application).

5 Systematically organize his/her work in scientific research and formulate realistic and original solutions to complex problems (application).

6 Critically evaluate scientific data from experiments or literature, and offer sound arguments to justify a position (judgment and communication).

7 Work independently as well as in a team to solve scientific and societal challenges related to medical pharmaceutical sciences (application).

8 Effectively communicate scientific concepts to specialists as well as to a lay audience through oral and written presentations (communication).

9 Identify societal and ethical implications of Medical Pharmaceutical Research and acts according to the scientific code of conduct (judgement).

10 Evaluate and reflect on personal capabilities and motivation for a (international) scientific, policy or business career, and has knowledge and skills to develop their own career (lifelong learning skills).

Appendix II Tracks of the degree programme (art. 3.5)

1. Within the degree programmes, the student chooses one of the Research-tracks written below (R-track), or one chooses the **Science, Business and Policy**-track ("SBP-track"), which prepares for professions in a societal, political and/or commercial context.

2. Within the degree programme Medical Pharmaceutical Sciences, the general R-track **Medical Pharmaceutical Sciences Research** track, provides students training as a researcher in various fields of medical pharmaceutical sciences.

3. Within the degree programme Medical Pharmaceutical Sciences, the R-track **Drug Toxicology and Translational Technology**, provides students training as a researcher mainly in the field of adverse drug reactions.

4. Within the degree programme Medical Pharmaceutical Sciences, the R-track **Pharmacoepidemiology and Pharmacoeconomics**, provides students training as a researcher in the area of pharmacovigilance, database research, observational and trial intervention methodology and utilization studies with specific attention to the role of pharmaceuticals in healthy ageing.

5. Within the degree programme Medical Pharmaceutical Sciences, the R-track **Pharmaceutical Design and Engineering**, provides students training as a researcher in the areas of target identification, drug design, biologics, biotechnology, and innovative drug and dosage forms.

Appendix III. Content of the degree programme (art. 3.6)

The degree programme Medical Pharmaceutical Sciences offers the following Research tracks (R-track): Medical Pharmaceutical Sciences Research, Drug Toxicology and Translational Technology, Pharmacoepidemiology and Pharmacoeconomics and Pharmaceutical Design and Engineering as well as a Science, Business and Policy track (SBP-track).

General requirements for all MPS R-Tracks:

Course unit	ECTS	Assessment	Practical	Entry requirements
research project (RP)	40	technical and/or laboratory skills, written report, oral presentation	x	Safe Microbiological Technique certificate#
research project (RP)	30	technical and/or laboratory skills, written report, oral presentation	x	Safe Microbiological Technique certificate#
colloquium	5	oral presentation	x	RP
essay	5	written report	x	-
master courses	≥ 30*	see appendix IV	see app. IV	see appendix IV
electives	≤ 5-10*	see appendix IV	see app. IV	see appendix IV

Students who have not obtained a Safe Microbiological Technique certificate (VMT in Dutch) have to include the MBS course in the first year of their study programme.
* Depending on the chosen track.

General requirements for the SBP-track:

Course unit	ECTS	Assessment	Practical	Entry requirements
research project (RP)	40	technical and/or laboratory skills, written report, oral presentation	x	Safe Microbiological Technique certificate#
colloquium	5	oral presentation	x	RP
Drug Development: from Design to Evaluation	5	assignment, written exam		
Academic Skills	5	Assignment, oral exam, written exam	x	
course units: Science & Business and Science & Policy	2x10 = 20	assignment, exam	x	-
work placement SBP	40	performance, written report, reflection report	x	RP, course units S&B and S&P
electives	≤ 5	see appendix IV	see app. IV	see appendix IV

Students who have not obtained a Safe Microbiological Technique certificate (VMT in Dutch) have to include the MBS course in the first year of their study programme, unless the student will conduct a research project that does not involve any laboratory work.

The following rules apply to all tracks:

- the first research project must be performed at the Faculty of Science and Engineering (FSE) or the University Medical Center Groningen, under supervision of one of the appointed. The grade of the first research project must be registered before a second research project or the SBP-internship can be started.
- the student chooses or is awarded a study mentor from the list to advise and discuss the contents of the individual degree programme, before sending a signed programme proposal for approval to the Board of Examiners.
- The tracks Drug Toxicology and Translational Technology, Pharmacoepidemiology and Pharmacoeconomics and Pharmaceutical Design and Engineering have designated mentors, as mentioned on the student portal.
- all elements of the individual programme must be approved by the Board of Examiners before their start. The research projects, colloquium and essay must deal with different research subjects, and must be supervised by different examiners appointed for MPS. The subject of the SBP-track internship must be clearly related to the scientific domain of MPS (see Appendix I). To conduct an SBP-internship, you will need 1. an SBP-examiner, and 2. a 'non-SBP MPS examiner'. The colloquium cannot be done in the Science & Society group or under supervision of an SBP-examiner in case you follow the SBP-variant.
- electives can be:
    - an extension of a research project. The research project can be registered as 30, 35, 40, 45 or 50 ECTS project. Propositions for extensions of 10-15 ECTS must be requested before the start of the research project. Arrangements for extensions of 5-10 ECTS may also be made during the midterm evaluation. The research project cannot exceed 50 ECTS.
    - extra master course units, including course units that are especially assigned as possible elective course units (see appendix IV).
    - a research assignment of 5 or 10 ECTS.

Additional requirements for Medical Pharmaceutical Sciences:

The course units Drug Development: from Design to Evaluation and Academic Skills are compulsory for all MPS students.

Additional requirements for the general research track Medical Pharmaceutical Sciences Research:

- 30 ECTS master courses are filled with the following courses:
  a. Courses (10 ECTS)

Course unit	ECTS
Drug Development: from Design to Evaluation	5
Academic Skills	5

  b. 20 ECTS of other master courses chosen from the MPS master courses as listed in appendix IV.

Additional requirements for the research track Drug Toxicology and Translational Technology:

- the subject of one research project (≥40 ECTS) and the subject of either the essay or the colloquium is chosen in the field of Toxicology and/or advanced translational models for drug testing.
- 30 ECTS master courses are filled with the following courses:
  a. Courses (20 ECTS):

Course unit	ECTS
Drug Development: from Design to Evaluation	5
Academic Skills	5
Molecular Toxicology	5
Advanced Pharmacokinetics	5

  b. A minimum of 5 ECTS from the following list:

Course unit	ECTS
Pharmacovigilance (biennial, does not run in 2021/2022)	5

Animal Experimentation	5
Reproductive Toxicology and Epidemiology	5
Nanomedicine and Nanosafety	5
Clinical Toxicology	5

c. 5 ECTS of other master courses chosen from the MPS master courses as listed in appendix IV.

Additional requirements for the research track Pharmacoepidemiology and Pharmacoeconomics:

- the subject of one research project (≥40 ECTS) and the subject of either the essay or the colloquium is chosen in the field of Pharmacoepidemiology and/or Pharmacoeconomics.
- 28 ECTS master courses are filled with the following courses:
  a. Courses (28 ECTS):

Course unit	ECTS
Drug Development: from Design to Evaluation	5
Academic Skills	5
Basics in Medicine	8
Clinical Pharmacoepidemiology*	5
Pharmaco-epidemiology in Practice OR Pharmacoeconomics **	5

* students who accomplished the equivalent course phar-epi (= pharmacoepidemiology (EN)/ farmacoepidemiologie (NL)) in their bachelor programme will be exempted from this requirement. The remaining 5 ECTS should be considered as 5 ECTS extra electives in their master programme.
** Students who did Introduction to Pharmacoeconomics in their Bachelor could also only take Advanced PharmacoEconomics.

b. ≤ 12 ECTS of other master courses chosen from the MPS master courses as listed in appendix IV. Preferred courses in this elective space are:

Course unit	ECTS
Advanced Pharmacoeconomics	5
Pharmacovigilance (biennial, does not run in 2021/2022)	5
Reproductive Toxicology and Epidemiology	5

Additional requirements for the research track Pharmaceutical Design and Engineering:

- the subject of one research project (≥40 ECTS) and the subject of either the essay or the colloquium is chosen in the field of target identification, drug design, biologics, biotechnology, or innovative drug and dosage forms.
- 30 ECTS master courses are filled with the following courses:
  a. Courses (20 ECTS):

Course unit	ECTS
Drug Development: from Design to Evaluation	5
Academic Skills	5
Pharmaceutical Biotechnology	5
Pharmaceutical Design and Engineering	5

b. A minimum of 5 ECTS from the following list:

Course unit	ECTS
Molecular Toxicology	5

Translational Research in Respiratory Disease	5

c. 5 ECTS of other master courses chosen from the MPS master courses as listed in appendix IV. Suggested master courses are given in table below:

Course unit	ECTS
Advanced Imaging Techniques	5
Nanomedicine and Nanosafety	5
Pharmaceutical Biology Practical	5
Medicinal Natural Products	10

Appendix IV Electives (art. 3.7.1)

Table 1 and 2 below list study elements that can be chosen as 'master courses' or 'electives' in MPS. Additional knowledge may be required in specific course units. These requirements will be published on Ocasys. For up to date information regarding the courses, such as assessment, entry requirements and learning objectives, Ocasys is leading.
Table 3 and 4 list courses that can only be chosen as electives in MPS. After consultation with the study mentor and approval of the Board of Examiners, students may also choose from options available from other departments, other universities in the Netherlands or even abroad.

Table 1: Master courses available for MPS

Course	ECTS
Advanced Pharmacoeconomics	5
Advanced Pharmacokinetics	5
Clinical Pharmacoepidemiology*	5
Medicinal Natural Products	10
Molecular Toxicology	5
Pharmaceutical Biology Practical	5
Pharmaceutical Biotechnology	5
Pharmacoeconomics	5
Pharmaco-epidemiology in Practice	5
Pharmacovigilance (biennial, does not run in 2021/2022)	5
Reproductive Toxicology and Epidemiology	5
Clinical Toxicology	5
Nanomedicine and Nanosafety	5
Microbiological Safety	1
Pharmaceutical Design and Engineering	5

*See remarks under Additional requirements for the research track Pharmacoepidemiology and Pharmacoeconomics

Table 2: General Life Sciences master courses

Course	ECTS
Advanced Imaging Techniques	5
Advanced Light Microscopy	5
Advanced Statistics	6
Applied statistics and modeling	5
Animal Experimentation	5
Behavioural Pharmacology	5
Big Data & Applications in biomedicine	5
From Big Data to Personalised Medicine	5
Neurobiology of Psychiatric Disorders	5
Science & Business#	10
Science & Policy#	10
Translational Research in Respiratory Disease	5
Orientation on International Scientific Careers	5
Radioisotopes in Experimental Biology	5
Tools and Approaches of Systems Biology	5

Students who follow a R-track/track may only choose one of these courses as part of the 'electives' and not as part of the 'master courses'.

Table 3: Elective master courses organized by other Master Programmes

Course	ECTS
DNA Micro-array Analysis	5
iGEM (International Genetically Engineered Machine competition)*	20
Introduction to the Pharmaceutical Industry	6-12
Pharmacology of Chronic Diseases and Ageing	5
Programming C++ for Biologists	5
Quantitative Bioanalysis	5
Skills in Science Communication (2a)	5
Solving Problems in Product Technology	6
Basiscursus Master Lerarenopleiding^	5
Masterstage 1^	5

* Selection for this competition takes place in winter time, an advertisement about application details will be announced via the student portal during the academic year. Maximum of 10 ECTS of the available 20 ECTS can be registered within elective space, the rest will be extracurricular credits.
^ Course unit offered in Dutch only.

Table 4: Elective master courses organised by The Donald Smits Center for Information Technology:

Course (max 2 ects per individual programme^)	Half day unit^
Access basic	5
Excel basic	5
Excel module draaitabellen	1

^ A minimum of 5 half day units is required for a study load of 1 ECTS, for 2 ECTS 11 units are needed. These courses have additional costs (low student tariff), which are at the student's own expenses. These courses are not available in Ocasys. Please consult the Center for Information Technology for further information, time schedules, language of instruction and enrolment details.

Appendix V Entry requirements and compulsory order of examinations (art. 4.4)

Course unit	Entry requirement
Research project	Safe Microbiological Technique certificate
Colloquium	Research project
Research project 2	Research project + Academic Skills
Work placement Science Business & Policy	Research project + courses Science & Business and Science & Policy

Appendix VI Admission to the degree programme

(art. 2.1A.1 + 2.1B.1)

1. Requirements for admission to the master degree in <u>Medical Pharmaceutical Sciences</u>

Holders of the following Bachelor's degrees from the University of Groningen are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Medical Pharmaceutical Sciences on that basis:

- a Bachelor's degree in Pharmacy.
- a Bachelor's degree in Life Science & Technology with one of the following majors:
  - Biomedical Sciences with the minor Pharmacy (or a similar approve programme in the area of Pharmacy) including the following course units: 1. Drugs for Endocrine System 2. Organic Synthesis & Biosynthesis ***OR*** Medicinal Chemistry & Biophysics 3. Pharmacology Practical 4. Drugs for the D/R/C systems 5. Pharmacokinetics 6. Metabolism & Toxicology.
  - Molecular Life Sciences with the minor Pharmacy (or a similar approve programme in the area of Pharmacy) including the following course units: 1. Drugs for Endocrine System 2. Organic Synthesis & Biosynthesis ***OR*** Medicinal Chemistry & Biophysics 3. Pharmacology Practical 4. Drugs for the D/R/C systems 5. Pharmacokinetics 6. Metabolism & Toxicology.
- a Bachelor's degree in Biology with one of the following majors
  - Biomedical Sciences with the minor Pharmacy (or a similar approve programme in the area of Pharmacy) including the following course units: 1. Drugs for Endocrine System 2. Organic Synthesis & Biosynthesis ***OR*** Medicinal Chemistry & Biophysics 3. Pharmacology Practical 4. Drugs for the D/R/C systems 5. Pharmacokinetics 6. Metabolism & Toxicology.
  - Molecular Life Sciences with the minor Pharmacy (or a similar approve programme in the area of Pharmacy) including the following course units: 1. Drugs for Endocrine System 2. Organic Synthesis & Biosynthesis ***OR*** Medicinal Chemistry & Biophysics 3. Pharmacology Practical 4. Drugs for the D/R/C systems 5. Pharmacokinetics 6. Metabolism & Toxicology.

Students lacking one or two of the above mentioned courses, may sometimes be admitted on the condition of including these courses within the electives of the master programme.

Students with a comparable Bachelor's degree from another Dutch or foreign university, focusing on knowledge and skills at the interface of molecular and cellular biology, human physiology, organic chemistry and biochemistry, statistics and pharmaceutical sciences, may also qualify for admission. However, admission is then granted on an individual basis by the Admission Board.

Appendix VII Transitional provisions (art. 7.1)

None for 2021/2022

Appendix VIII Additional Requirements Open degree Programmes (Art. 5.6)

Students wishing to pursue an open degree programme should file a request with the Board of Examiners.

Appendix IX

Application and decision deadlines for admission

(art. 2.6.1 and 2.6.3)

Programmes starting on 1 September 2021

Programme	**Deadline of Application**	**Deadline of decision**
Behavioural and Cognitive Neurosciences	1 May 2021	1 June 2021
Biology	1 May 2021	1 June 2021
Biomedical Engineering	1 May 2021	1 June 2021
Biomedical Sciences	1 May 2021	1 June 2021
Biomolecular Sciences	1 May 2021	1 June 2021
Ecology and Evolution	1 May 2021	1 June 2021
Energy and Environmental Sciences	1 May 2021	1 June 2021
Human-Machine Communication	1 May 2021	1 June 2021
Marine Biology	1 May 2021	1 June 2021
Mechanical Engineering	1 May 2021	1 June 2021
Medical Pharmaceutical Sciences	1 May 2021	1 June 2021
Nanoscience: for non-EU/EEA students	1 February 2021	1 June 2021
Nanoscience: for EU/EEA students	1 May 2021	1 June 2021
Science Education and Communication	1 May 2021	1 June 2021

Programmes starting on 1 September 2021 and 1 February 2022

Programme	Deadline of Application for 1 September	Deadline of decision for 1 September	Deadline of Application for 1 February	Deadline of decision for 1 February
Applied Mathematics	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Applied Physics	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Artificial Intelligence	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Astronomy	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Chemical Engineering	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Chemistry	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Computing Science	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Farmacie	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Industrial Engineering and Management	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Mathematics	1 May 2021	1 June 2021	15 October 2021	15 November 2021
Physics	1 May 2021	1 June 2021	15 October 2021	15 November 2021