Master degree programmes
Biomedical Sciences
Medical Pharmaceutical Sciences

Appendices to the Teaching and Examination Regulations 2013-2014

Appendix I. Teaching outcomes of the degree programme (art. 1.3)

Graduates Biomedical Sciences (BMS) and Medical Pharmaceutical Sciences (MPS):

1 have detailed understanding of the scientific disciplines on the interface between molecular and cellular biology, integrative physiology and behaviour, and medical/pharmaceutical sciences, providing a tailored framework continuing into acquisition of in depth knowledge on:
   - (the assessment of) health maintenance and development of disease (for BMS graduates), or
   - applying drug intervention of diseases, covering the whole range of drug *development* disciplines from basic drug target discovery and molecular modeling of new entities and molecular targets, to pharmacoepidemiology and post marketing surveillance (for MPS graduates)

2 are capable of designing and conducting scientific research
3 are capable of independently investigating, and critically evaluating, scientific literature
4 are capable of identifying new developments in the relevant disciplines, and to become familiar with these developments
5 are organised and creative in the approach to scientific research and complex problems
6 can participate in, and contribute to, a multidisciplinary team
7 can effectively communicate acquired knowledge, insights and skills to others, both in writing and in oral presentation
8 are aware of the potential societal and ethical implications of scientific research, and are able to critically reflect on their actions in this context
9 are prepared for a professional career, either in science or in policy & management

Appendix II. Specializations of the degree programme (art. 2.2)

1. Within the degree programmes, the student chooses one of the following profiles:
a. P-profile ("PhD-profile"), which provides training as a researcher;
b. M-profile ("Science, Business and Policy -profile"), which prepares for professions in a societal, political and/or commercial context.

2. Within the degree programme Biomedical Sciences students can follow the specialization **Biology of Ageing** which provides training as a researcher mainly in the field of ageing and age-related pathologies.

3. Within the degree programme Medical Pharmaceutical Sciences students can follow the specialization **Toxicology and Drug Disposition** which provides training as a researcher mainly in the field of adverse drug reactions.

4. Within the degree programme Medical Pharmaceutical Sciences students can follow the specialization **Pharmacoepidemiology** which provides training as a researcher in the subjects of pharmacovigilance, database research, observational and trial intervention methodology and utilization studies with specific attention to the role of pharmaceuticals in healthy ageing.

Appendix III. Content of the degree programme (art. 2.3)

1. The degree programmes consist of either the P- or the M-profile:

P- profile (Research profile):

Study elements	ECTS	entry requirements	assessment	practical
research project (RP)*	40 or ≥	-	technical and/or laboratory skills, written report, oral presentation	x
research project (RP)*	30 or ≥	-	technical and/or laboratory skills, written report, oral presentation	x
colloquium	5	RP	oral presentation	x
essay	5	-	written report	x
optional courses	20	see appendix IV	see appendix IV	see app. IV
electives**	≤ 20	see appendix IV	see appendix IV	see app. IV

M-profile (Science, Business and Policy –profile):

Study elements	ECTS	entry requirements	assessment	practical
research project (RP)*	40 or ≥	-	technical and/or laboratory skills, written report, oral presentation	x
colloquium	5	RP	oral presentation	x
optional courses	5	see appendix IV	see appendix IV	see app. IV
internship	40	RP	performance, written report, reflection report	X
course *beta en bedrijf*	10	-	assignment, exam	X
science and business	10	-	assignment, exam	X
electives**	≤ 10	see appendix IV	see appendix IV	see app. IV

2. In addition to the above scheme the following rules apply to all programmes:

- * the first research project must be performed at the School of Life Sciences or the University Medical Center Groningen under supervision of one of the examiners. The mark of the first research project must have been registered before starting a second research project.
- research projects, colloquium and essay must deal with different research subjects, must be supervised by a different examiner, and be approved of by the Board of Examiners.
- the subject of the M-profile internship must be clearly related to the scientific domain of the chosen master programme (see Appendix I, 1).
- ** electives: the student may choose:
    - to use 5 - 20 ECTS to extend a research project,
    - to attend extra optional courses (see appendix IV) or non-scheduled electives from the pharmacy master programme,
    - to do a maximum of 10 ECTS on bachelor courses from one of the relevant bachelor programmes of the school of life sciences, or
    - to perform a research assignment of 5, 10, 15 or 20 ECTS.

  During the midterm review one may extend the research project with 5 -10 ECTS only.
- the student chooses a mentor from the list of each Master programme to advise and discuss the contents of the individual degree programme before approval of the Board of Examiners.
- all elements in the individual programme must be approved of by the Board of Examiners.

3. Additional requirements for Biomedical Sciences

a. Additional requirements for the specialization Biology of Ageing:

- students follow the P-profile scheme,
- topics of both research projects are chosen within the biology of ageing research area,
- the programme of the individual student must be discussed with and approved by the coordinator of the specialization,
- 20 ECTS modules are done as follows:

a. compulsory courses (10 ECTS)

course	ECTS	entry requirements	assessment	practical
current themes in healthy ageing	5	-	written exam, assignment	x
molecular biology of ageing and age- related diseases	5	-	written exam, oral presentation, assignment	x

b. 10 ECTS from the following list:

course	ECTS	entry requirements[1]	assessment	practical
advanced metabolism & nutrition	5	metabolisme & voeding or integratieve neurobiologie	written exam, assignment	x
immunology: from bedside to bench and back	5	immunologie I+II	written exam, oral presentation, report	x
neurodegenerative diseases	5	integratieve neurobiologie	written exam, oral presentation	x
stem cells & regenerative medicine	5	regenerative medicine, mol. biologie & med. biologie or immunology I	oral presentation, written report	x

[1]. Entry requirements usually refer to courses out of bachelor programmes of the school of life sciences. Student who did not successfully follow these bachelor courses shall include these courses within the electives of the master programme.

4. Additional requirements for Medical Pharmaceutical Sciences:

a. The course Drug Development is compulsory.

b. Additional requirements for the specialization **Toxicology and Drug Disposition**:

- students follow the P-profile scheme,
- topics of both research projects are chosen within the toxicology and drug disposition research area,
- the programme of the individual student must be discussed with and approved by the coordinator of the specialization,
- 20 ECTS courses are done as follows:

a. compulsory courses (15 ECTS):

course	ECTS	entry requirements[1]	assessment	practical
drug development	5	-	written exam, assignment	x
molecular toxicology	5	-	written exam, assignment	x
advanced pharmacokinetics	5	fakin, metox	written exam, assignment	x

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

course	ECTS	entry requirements[1]	assessment	practical
pharmacovigilance	5	-	written exam, assignment (oral presentation, report)	x
animal and human experimentation (**or** handling laboratory animals)	5 (**or** 4)	-	written exam, assignment	x
reproductive toxicology	5	metox, far-epi	assignment	x
innovative dosage forms	5	-	written exam, report	x

1. courses from the bachelor programme pharmacy. A student who did not accomplish these bachelor courses shall include these courses within the electives of the master programme.

c. Additional requirements for the specialization Pharmacoepidemiology:
   - students follow the P-profile scheme,
   - students obtain 30 ECTS master courses according to list A. They choose 10 ECTS electives preferably form list B,
   - the subject of the 40 ECTS research project is pharmacoepidemiology. The other research project is chosen in another discipline within the domain of the master programme,
   - the programme of the individual student must be discussed with and approved by the coordinator of the specialization,
   - list A, compulsory modules of the specialisation pharmacoepidemiology:

Course	ECTS	entry requirements	assessment	practical
drug development	5	-	written exam, assignment	x
medical statistics	3	-	written exam	-
basics in medicine	8	-	written exam	-
pharmacoepidemiology UK*	5	-	written exam	x
advanced topics in pharmacoepidemiology	4	PiP	written exam, written report	x
pharmacoepidemiology in practice	5	far-epi	presentation, report	x

* students who did accomplish the equivalent course far-epi (= farmacoepidemiologie) in their bachelor programme will be exempted from this requirement. They shall include 5 ECTS extra electives in their master programme.

   - list B, suggested electives:

Course	ECTS	entry requirements	assessment	practical
advanced pharmacoepidemiology	5	PiP	report	x
pharmaco-economics	5	-	written exam, assignment	x
drug utilization research & quality of drug use	5	PiP	assignments	x
pharmacovigilance	5	far-epi[1]	written exam, assignment	x
reproductive toxicology	5	metox, far-epi[1]	assignment	x

[1]. courses from the bachelor programme pharmacy. A student who did not accomplish these bachelor courses shall include these courses within the electives of the master programme.

Appendix IV Optional Courses (art. 2.4) and Appendix V Entry requirements and compulsory order of examinations (art. 3.2)

The following list presents optional courses for each programme. After consultation with the study mentor, students can also choose courses from related programmes.

General Life sciences courses

course	ECTS	entry requirements*	assessment	practical
advanced light microscopy	5	-	theoretical exam, assignment	x
advanced imaging techniques	5	-	written exam, oral presentation	x
advanced statistics	5	biostatistics	written exam	
animal and human experiment.: design, practice and ethics (**or** handling laboratory animals)	5 (**or** 4)	a supervisor approved planning of a master subject involving human or animal experimentation	theoretical exam, assignment	x
behavioural pharmacology	5	-	written exam, oral presentation	x
introduction to the behavioural and cognitive neurosciences	4	-	written reports	x
course *beta en bedrijf*	10	-	assignment, exam	x
science and business	10	-	assignment, exam	x
orientation on international scientific careers	5	-	assignment	x
programming in C^{++} for biologists	5	-	assignment	x
radioisotopes in experimental biology	5	-	laboratory skills, written exam	x
tools and approaches of systems biology	5	-	written exam, oral presentation	x

Courses organised for Biomedical sciences

course	ECTS	entry requirements*	assessment	practical
advanced metabolism & nutrition	5	metabolisme & voeding or integratieve neurobiologie	written exam, assignment	x
current themes in healthy ageing	5	-	written reports, oral presentation	x
current themes in inflammation and cancer	5	immunologie I	written exam, oral presentation	x
immunology: from bedside to bench and back	5	immunologie I+II	written exam, oral presentation, report	x
molecular biology of ageing and age-related diseases	5	-	written exam, oral presentation, assignment	x
neurodegenerative diseases	5	integratieve neurobiologie	written exam, oral presentation	x
nutrigenomics research	5	metabolisme & voeding or integrative neurobiologie or advanced metabolism & nutrition	written exam, assignment	x
scientific writing	5	a graded report prepared for a research project	written report	x
stem cells & regenerative medicine	5	regenerative medicine or mol. biologie & med. biologie or immunologie I	oral presentation, written report	x

Courses organised for Medical pharmaceutical sciences

course	ECTS	entry requirements*	assessment	practical
advanced pharmacoepidemiology	5	PiP	report	x
advanced topics in pharmacoepidemiology	4	PiP	written exam, written report	x
advanced pharmacokinetics	5	fakin	written exam, assignment	x
drug development	5	-	written exam, assignment	x
drug utilization research & quality of drug use	5	PiP	assignments	x
industrial bioanalysis	5	FAA+FAB	written exam, presentation	x
innovative dosage forms	5	-	written exam, report	x
medicinal natural products	10	-	reports	x
molecular toxicology	5	fakin, metox	exam, assignment	x
pharmaceutical biology practical	6	-	reports	x
pharmaceutical biotechnology	6	-	reports	x
pharmaco-economics	5	-	written exam, assignments	x
pharmacoepidemiology in practice	5	-	presentation, report	x
pharmacoepidemiology UK#	5	-	written exam	x
pharmacovigilance	5	-	written exam, assignment	x
reproductive toxicology	5	metox, far-epi	assignment	x
selected topics in molecular pharmacology	3	receptorfarmacologie	oral exam	-

students who accomplished the equivalent course far-epi (= farmacoepidemiologie) in their bachelor programme cannot take this course in the master programme.

Courses organized for Molecular biology and biotechnology

course	ECTS	entry requirements*	assessment	practical
DNA micro-array analysis	5	microbiologie en genetica research	report, oral presentation	x
biocatalysis and green chemistry	5	(bio)organische chemie, moleculen & reactiviteit	written exam, assignments	x
topics in enzymology	5	-	written exam	x

** Entry requirements usually refer to courses out of bachelor programmes of the school of life sciences. Students who did not accomplish these bachelor courses shall include these courses within the electives of the master programme.*

Appendix VI Admission to the degree programme and different specializations (art. 4.1.1 + art. 4.2)

1. Requirements for admission to the master degree in <u>Biomedical 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 Biomedical Sciences on that basis:

- a Bachelor's degree in Biology with one of the following majors:
  - Biomedische wetenschappen.
  - Gedrag & neurowetenschappen including/plus the courses bio-organische chemie, immunologie I and Moleculaire biologie en medische biologie.
  - Moleculaire levenswetenschappen plus the minor Biomedische wetenschappen/Gedrag & neurowetenschappen (including the courses receptorfarmacologie, immunology and moleculaire biologie en medische biologie).
- a Bachelor's degree in Life Science & Technology with one of the following majors:
  - Biomedische wetenschappen.
  - Gedrag & neurowetenschappen including/plus the courses bio-organische chemie, immunologie I and Moleculaire biologie en medische biologie.
  - Moleculaire levenswetenschappen plus the minor Biomedische wetenschappen/Gedrag & neurowetenschappen (including the courses receptorfarmacologie, immunology and moleculaire biologie en medische biologie).
  - Medisch farmaceutische wetenschappen plus the courses (farmaceutische/medische) microbiologie and neurobiologie.
- a Bachelor's degree in Pharmaceutical Sciences plus the minor Biomedische wetenschappen/ Gedrag en neurowetenschappen.

Students who did not pass the above mentioned bachelor modules have to include these courses within the electives of the master programme.

2. 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 or Pharmaceutical Sciences.
- a Bachelor's degree in Life Science & Technology with one of the following majors:
  - Medisch farmaceutische wetenschappen.
  - Biomedische wetenschappen including/plus the courses receptorfarmacologie and geneesmiddel van target tot gebruik, or the minor farmaceutische wetenschappen.
  - Moleculaire levenswetenschappen plus the minor Biomedische wetenschappen/Gedrag en neurowetenschappen (including courses receptorfarmacologie and immunology), or the minor farmaceutische wetenschappen.
- a Bachelor's degree in Biology with one of the following majors
  - Biomedische wetenschappen including/plus the courses receptorfarmacologie and geneesmiddel van target tot gebruik, or the minor farmaceutische wetenschappen.
  - Moleculaire levenswetenschappen plus the minor Biomedische wetenschappen/Gedrag en neurowetenschappen (including courses receptorfarmacologie and immunology), or the minor farmaceutische wetenschappen

Students who did not pass the above mentioned bachelor modules have to include these courses within the electives of the master programme.