

Note:

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The legally binding versions are found in the University of Innsbruck Bulletins (in German).

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Curriculum for the
Master's Programme Pharmacy
at the Faculty of Chemistry and Pharmacy of the University of Innsbruck

§ 1 Allocation of the study programme

Acc. to §54 par. 1 of the Universities' Act 2002, the Master's Programme in Pharmacy is allocated to the group of natural science studies.

§ 2 Qualification profile

- (1) The Master's Programme Pharmacy aims at imparting extensive knowledge of the development, production, quality assurance, composition, preparation and storage, the biological effects and interaction of drugs/medicines and their safe applications.
- (2) Having completed the Master's Programme Pharmacy, the graduates are able:
 - to carry out scientific work (including planning and implementation),
 - to transfer and apply scientific methods and insights of the pharmaceutical sciences to other issues,
 - to apply scientific methods and findings in related natural sciences,
 - to provide information and advice to patients in relevant aspects of pharmacy,
 - to advise physicians on pharmacy/drug therapy.
- (3) The Master's Programme Pharmacy is the basis for a Doctoral or PhD-Programme in Pharmacy or related study programmes.
- (4) Because of their knowledge and skills, the graduates of the Master's Programme Pharmacy have the fundamental requirements for professional occupations in the following fields:
 - public pharmacies,
 - hospitals (pharmacy, clinical pharmacy),
 - industry (research and development, manufacturing, authorisation, quality assurance),
 - universities (research and teaching),
 - testing institutions (forensic analysis, environmental protection, narcotic drug analysis, army health service, residue analysis, control laboratories)

- health authorities, pharmaceutical wholesalers, schools (PKA-training (pharmaceutical commercial assistant), specialist publishing houses.

§ 3 Scope and duration

The Master's Programme Pharmacy covers 120 ECTS-Credits. This corresponds to a study duration of four semesters. One ECTS-Credit corresponds to a workload of 25 hours.

§ 4 Admission

- (1) Admission to the Master's Programme Pharmacy requires the completion of a subject-specific Bachelor's Programme or a subject-specific Bachelor's Programme at a University of Applied Sciences or another comparable study programme at an approved post-secondary educational institution home or abroad.
- (2) In any case, the Bachelor's Programme Pharmacy at the University of Innsbruck is considered a relevant study programme. The rectorate decides, according to the Universities' Act, on study programmes in question or on the equivalence of a study programme passed at a post-secondary educational institution home or abroad for the admission to the Master's programme.
- (3) In the event that equivalence has been established in principle but with certain qualifications missing for full equivalence, supplemental examinations may be required by the rectorate. These examinations must be passed during the respective master's programme.

§ 5 Types of courses and maximum number of participants

- (1) Courses without continuous performance assessment:

Lectures (VO) are courses held in lecture format. They introduce the research areas, methods and schools of thought for a given subject. No maximum number of participants.

- (2) Courses with continuous performance assessment:

1. Practical courses (UE) focus on the practical treatment of concrete scientific tasks within an area.

For practical courses in elective modules and the following (phyto)chemical courses the maximum number of participants is 10:

- a) Quality Control of Medicinal Plants
- b) Chemical Diagnostics
- c) Working Techniques I
- d) Working Techniques II

For the following technological practical courses the maximum number of participants is 12: Preparation of Prescription Medication

2. Seminars (SE) provide in-depth treatment of scientific topics through students' presentations and discussion thereof.

For seminars of elective modules the maximum number of participants is 10.

3. Lectures with practical elements (VU) focus on the practical treatment of concrete scientific tasks that are discussed during the lecture parts of the course.

Lectures with practical elements of elective modules and the following courses have a maximum number of participants of 10: Biochemical and Biomolecular Exercises.

For the lecture with practical element (VU) Drug Therapy and Medication Management II the maximum number of participants is 15. There is currently no maximum number of participants for other VU-courses.

- Excursions (EX), conducted outside the premises of the university, serve to demonstrate and deepen course contents. Maximum number of participants: 30.

§ 6 Allocation of places in courses with a limited number of participants

In courses with a limited number of participants, course places are allocated as follows:

- Students for whom the study duration would be extended due to the postponement are to be given priority.
- If criterion no. 1 does not suffice for regulating the admission, then first, students for whom the course is part of a compulsory module are to be given priority, and second, students for whom the course is part of an elective module.
- If the criteria in no. 1 and 2 do not suffice for regulating the admission, then the date of the acquisition of the requirements are used for regulating the admission.
- If the criteria in no. 1, no. 2 and no. 3 do not suffice for regulating the admission, then the grade in the module which is the prerequisite for taking the respective course is used.
- If the criteria listed before do not suffice for regulating the admission to a course, then the remaining courses are raffled.

§ 7 Compulsory and elective modules

- The following compulsory modules corresponding to altogether 82.5 ECTS-Credits must be passed:

1.	Compulsory Module: Biochemistry and Molecular Biology	h	ECTS-Credits
	VU Biochemical and Molecular Biological Practical Course Carrying out practical experiments for the analysis of proteins and nucleic acids, enzyme activities, preparation and analysis of DNA, differential gene expression, recombinant protein expression and purification	3	2.5
	Total	3	2.5
	Learning Outcomes: Students are familiar with methods for protein and nucleic acid characterisation, genetic engineering and enzymology, and are able to apply them to the preparation and analysis of DNA, differential gene expression analysis, and recombinant protein expression and purification.		
	Prerequisites: none		

2.	Compulsory Module: Pharmacognosy – Biogenous Drugs	h	ECTS-Credits
a.	VO Biogenous Drugs Pharmacognostic fundamentals of herbal drugs used in selected diseases (cardiovascular system, respiratory tract, gastrointestinal tract, etc.), their morphological characteristics, typical ingredients and proper use	4	8

b.	UE Quality Control of Medicinal Drugs Practical verification of the identity and quality (purity, content) of herbal drugs according to pharmacopoeia monographs, use of macroscopic and microscopic methods, chemical methods and chromatographic techniques	4	4.5
	Total	8	12.5
	Learning Outcomes: Students are able to describe the most important medicinal plants in terms of their morphological features and typical ingredients or their use. They know the mechanisms underlying the effects and potential dangers. They are able to apply pharmacopoeias for identity, purity and content testing to determine the quality of selected herbal drugs in a testing laboratory.		
	Prerequisites: none		

3.	Compulsory Module: Pharmacology and Drug Therapy I	h	ECTS-Credits
	VO Drug Therapy and Clinical Pharmacy I Evidence-based drug therapy of important human diseases, possibilities and limitations of non-pharmacological therapeutic measures (including diet modification and dietary supplements)	5	10
	Total	5	10
	Learning Outcomes: Students are able to describe the evidence-based drug therapy of major diseases and non-medical adjuvant / alternative therapies, including diet modification. They cover pharmacoeconomic fundamentals and the principles of medication management, personalised drug therapy, drug safety and disease prevention. The contents of technical and usage information can be explained.		
	Prerequisites: none		

4.	Compulsory Module: Pharmaceutical Chemistry	h	ECTS-Credits
	VO Medical Chemistry The overall process for drug discovery and development, beginning with target identification, lead discovery and drug optimisation, to final clinical trials, is discussed in general terms. The synthetic approach to different substance classes is shown. The optimisation of development candidates through structure-activity and structure-property relationships as well as their in vitro and in vivo pharmacokinetic and pharmacodynamic characterisation studies are explained and presented.	2	5
	Total	2	5
	Learning Outcomes: The students have basic knowledge of drug discovery, drug design and drug development. They recognise structure-based mechanisms of drug action and can demonstrate their action and target interactions based on the physicochemical properties of selected drugs. They are able to classify drugs based on their chemical affinity and derive general activity spectra.		
	Prerequisites: none		

5.	Compulsory Module: Pharmaceutical Technology	h	ECTS-Credits
	VO Pharmaceutical Technology II Pharmaceutical-pharmacological tests according to the pharmacopoeia, main production of medicaments, structure and validity of recipes, powders, aerosols, granules, tablets, capsules, coated solid dosage forms, solutions, suspensions, emulsions, semi-solid preparations (ointments, gels, creams, pastes, pastes for packs)	2	5
	Total	2	5
	Learning Outcomes: The students have basic pharmaceutical and technological knowledge for the preparation, characterisation and testing of major drug forms as well as for the evaluation of instabilities and incompatibilities. They are familiar with the preparation of homeopathic preparations.		
	Prerequisites: none		

6.	Compulsory Module: Preparation of Prescription Medication	h	ECTS-Credits
a.	VO Introduction to the Preparation of Prescription Medication Theoretical fundamentals of compounding formulas; discussion and explanations of formulas and assignments for galenic preparations; legal fundamentals: Prescription requirement, narcotics law, maximum doses, requirements of pharmacopoeias for medicinal preparations; properties, testing and evaluation of the basic and auxiliary substances necessary for the production of medicines as well as common active substances and packaging materials	2	4
b.	UE Preparation of Prescription Medication Formulas are made according to formula regulations and formulas in pharmacy scale are tested according to the pharmacopoeia. Essential work steps and calculations are demonstrated in small groups and individually implemented by all participants.	5	6
	Total	7	10
	Learning Outcomes: Students know the theory for making compounding formulas and are able to apply it in practice. This includes the required tested according to the pharmacopoeia of all bases and excipients as well as common active ingredients and packaging.		
	Prerequisites: none		

7.	Compulsory Module: Pharmacology and Drug Therapy II	h	ECTS-Credits
a.	VO Drug Therapy and Clinical Pharmacy II Evidence-based drug therapy of important human diseases, possibilities and limitations of non-pharmacological therapeutic measures (including diet modification and dietary supplements), pharma-economical aspects	4	9
b.	VU Drug Therapy and Medication Management II Instructions for independent dealing with current issues in medical therapy	1	1
	Total	5	10

	<p>Learning Outcomes: Students are able to describe the evidence-based drug therapy for important diseases as well as the non-medical concomitant/alternative therapies including diet modification. They understand the fundamentals of pharmaco-economics as well as the principles of medication management, individual drug therapy, drug safety and disease preventions. They are able to explain the contents of patient information leaflet and summaries of product characteristics.</p>
	<p>Prerequisites: none</p>

8.	Compulsory Module: Chemical Diagnostics I	h	ECTS-Credits
a.	<p>VO Bioanalytical Methods in Pharmaceutical Chemistry Overview of important methods of bioanalytics (e.g. peptide analysis, immunoassays and analysis of metabolites) and their application in practice</p>	1	1.5
b.	<p>VO Methods of Chemical Diagnostics Essential characteristics of chemical diagnostics, overview of important methods and procedures and their application in clinical chemistry (e.g. urinalysis, enzyme analysis, pregnancy tests, neonatal screening, tumour markers, HIV diagnostics)</p>	2	3.5
	Total	3	5
	<p>Learning Outcomes: students are able to describe different methods (wet chemical evidence, rapid tests) of the qualitative and / or quantitative analysis as well as laboratory diagnostic parameters and the application of these methods. They can critically assess the methods, the results of the analyses and the diagnostic interpretation, and recognise possible errors / problems.</p>		
	<p>Prerequisites: none</p>		

9.	Compulsory Module: Chemical Diagnostics II	h	ECTS-Credits
	<p>UE Chemical Diagnostics Learning and applying of various methods in the field of bioanalytics, clinical chemistry and chemical diagnostics</p>	6	7.5
	Total	6	7.5
	<p>Learning Outcomes: Students can demonstrate their knowledge of important biochemical and clinical chemistry (urinalysis, substrate concentration, enzyme activity and metabolite determinations, pregnancy tests and various rapid tests).</p>		
	<p>Prerequisites: positive completion of compulsory module 8</p>		

10.	Compulsory Module: Pharmaceutical Practice	h	ECTS-Credits
a.	<p>VO Law for Pharmacists Fundamentals of pharmaceutical law, pharmacy law, substance abuse law, chemicals and poison law as well as aspects of the trade-specific code of conduct (chamber of pharmacies law, Salary Insurance Act etc.)</p>	1	2
b.	<p>EX Pharmaceutical Research in Industry Practical insights into the processes and tasks of companies in the pharmaceutical, chemical or food industry</p>	1	0.5

	Total	2	2.5
	Learning Outcomes: Students are able to explain the legal basis for dispensing medicines and operating pharmacies. They have insights into the industrial production of pharmaceuticals and chemical products as well as their disposal.		
	Prerequisites: none		

11.	Compulsory Module: Introduction to Scientific Working I	h	ECTS-Credits
a.	UE Working Techniques I Learning of the practical and theoretical working techniques necessary for completing the Master's Thesis in one of the four pharmaceutical core areas	2	2
b.	SE New Research Results I Seminar lectures by national and international experts provide insights into current topics in pharmacy.	2	2
c.	Scientific Writing and Statistics Structure and proper writing of scientific papers (e.g. Master's Thesis) and publications for specialist journals, style, categories, quality criteria and correct quoting; theory and application of statistical methods for capturing, depicting and interpreting scientific data and results (analysis of variance, multivariate methods, PCA etc.)	1	1
	Total	5	5
	Learning Outcomes: Students are able to summarise and apply relevant techniques and methods required for writing the Master's Thesis. They understand advanced statistical methods and know current trends in pharmaceutical research.		
	Prerequisites: positive completion of compulsory modules 2-7		

12.	Compulsory Module: Introduction to Scientific Working II	h	ECTS-Credits
a.	UE Working Techniques II Learning of practical and theoretical working techniques in one of the four pharmaceutical core areas, but not in the subject of the Master's Thesis	2	2
b.	SE New Research Results II Lectures by national and international experts provide insights into current topics in pharmacy	2	3
	Total	4	5
	Learning Outcomes: Students are able to summarise and apply relevant techniques and methods in one pharmaceutical core area, but not the field of the Master's Thesis. They have insights in current trends in pharmaceutical research.		
	Prerequisites: positive completion of compulsory modules 2-7 and 9		

13.	Compulsory Module: Master's Thesis Defense	h	ECTS-Credits
	Oral defense of the Master's Thesis before an examination board to finalise the studies		2.5
	Total		2.5
	Learning Outcomes: Reflection of the Master's Thesis in the overall contexts of the Master's Programme; The focus is on theoretical understanding, methodological foundations, imparting the results of the Master's Thesis as well as presentation skills.		
	Prerequisites: positive completion of all other compulsory and elective modules as well as the Master's Thesis		

(2) Two elective modules corresponding to a total of 15 ECTS-Credits must be passed:

1.	Elective Module: Patient-Oriented Aspects in Pharmacy	h	ECTS-Credits
a.	VO Patient-Oriented Aspects in Pharmacy Discussion of selected chapters of drug therapy with high practical relevance involving physicians and pharmacists	1	3
b.	SE Patient-Oriented Aspects of Drug Therapy Instruction on independent application of acquired knowledge for the evaluation and preparation of drug treatment plans; presentation of the results in written and oral form	2	3
c.	UE Patient-Oriented Aspects in Drug Therapy Practical exercises on selected relevant therapeutic and toxicological issues	1	1.5
	Total	4	7.5
	Learning Outcomes: Students are able to describe the evidence-based drug therapy of specific diseases and the individualised / personalised drug therapy for specific patients and patient populations. They are able to optimise drug therapy, the medication management and can individually advise in consideration of communicative aspects. They understand the implementation and interpretation of specific diagnostic methods relevant to pharmacies.		
	Prerequisites: positive completion of compulsory modules 3 and 7		

2.	Elective Module: Analysis of Natural Products	h	ECTS-Credits
a.	SE Structure Determination of Natural Products by NMR and MS Theoretical fundamentals in nuclear magnetic resonance spectroscopy and mass spectrometry, device types and measuring methods, interpretation of NMR and MS spectra of natural products	2	2
b.	SE Modern Analytical Techniques – Coupling Techniques Functioning and construction of various analytical coupling techniques such as HPLC-MS, GC-MS and CE-MS, comparison and application of selected techniques for natural product analysis	1	2

c.	VU Analysis of Poisons, Drugs and Doping Substances Overview of toxic natural products, natural narcotic drugs and illegal substances based on natural products (e.g. doping substances), detection and quantification of selected compounds in herbal or (illegal) commercial products	1	3.5
	Total	4	7.5
Learning Outcomes: The students demonstrate their practical knowledge of the application of modern methods in natural substance analysis for the detection of toxic / illegal substances in plant preparations. They are familiar with the basics of structure elucidation of complex compounds by MS and NMR and can describe the advantages of new analytical methods (e.g. HPLC-MS).			
Prerequisites: positive completion of compulsory module 2			

3.	Elective Module: Cosmetics in Pharmacy	h	ECTS-Credits
a.	VO Cosmetics I History, definitions, skin and skin appendages, skin effects, skin cleansing, cleansing milk, exfoliation, acne treatment, perspiration inhibitors	1	2
b.	VO Cosmetics II Solutions, gels, deodorant sticks, deodorant roll-ons, tonics, perfumes, cosmetics, day and night creams, makeup creams, masks, hair care, foot care, cosmetics with protective function, sun protection, protection against the cold, insect protection, protection against harmful environmental factors	1	2
c.	SE Cosmetics Independent handling of questions in cosmetics in smaller groups with concluding discussion of the data gained between different groups	1	2
d.	UE Cosmetics Preparation of creams, gels and emulsions; essential work steps and calculations are demonstrated in small groups and implemented individually.	1	1.5
	Total	4	7.5
Learning Outcomes: The students have theoretical knowledge (historical, definitions as well as skin and skin appendages) and practical basic knowledge in the field of cosmetics, such as the independent production of selected products and their characterisation.			
Prerequisites: successful completion of compulsory modules 5 and 6			

4.	Elective Module: Drug Design	h	ECTS-Credits
a.	VO Modern Methods in Drug Discovery Possibilities of finding active ingredients or lead compounds, strategies for optimising pharmacodynamic and / or pharmacokinetic properties of biologically active compounds	1	2
b.	VO Modern Synthetical Methods Development of strategies for the synthesis of new bioactive compounds using modern methods such as microwave-assisted and solid-phase synthesis, enzymatic and non-enzymatic catalysis	1	2

c.	VU Drug Design Application of the techniques taught in the lectures for the synthesis and optimisation of new drugs as well as the analysis of structure-activity relationships by applying in-silico methods; presentation of results	2	3.5
	Total	4	7.5
	Learning Outcomes: Students are able to describe and apply modern methods for the discovery of new drugs using <i>in silico</i> and <i>in vitro</i> methods as well as current methods of planning and performing syntheses. As an example the analysis of structure-activity relationships with consideration of the 3D structure of the target or the lead optimisation in terms of pharmacokinetic and pharmacodynamic properties is mentioned.		
	Prerequisites: positive completion of compulsory module 4		

5.	Elective Module: Clinical Pharmacy	h	ECTS-Credits
a.	VO Current Aspects of Gene Therapy Theory and current status of gene therapy	1	2
b.	VO Aspects of Drug Therapy in Hospital Pharmacy Specific tasks and activities of the hospital pharmacy (including polypharmacy in old age, drug safety)	1	2
c.	SE Selected Aspects of Clinical Pharmacy, including Gender-Specific Aspects Discussion of current developments in drug therapy, including gender-specific drug reactions, and their potential relevance to health care; presentation of results	1	2
d.	VO Radiopharmacy Introduction to the fundamentals of radiopharmacy	1	1.5
	Total	4	7.5
	Learning Outcomes: The students are familiar with medical-related workflows in hospital pharmacies and the importance of interdisciplinary consultation at the bedside. They are familiar with current opportunities for gene therapy and with gender-relevant aspects of drug therapy.		
	Prerequisites: positive completion of compulsory modules 3 and 7		

6.	Elective Module: Complementary Medicine	h	ECTS-Credits
a.	VO Alternative Treatments and Healing Methods I - Homeopathy Development of the therapy concept and basic principles of homeopathy (similarity principle), specific production instructions, potentiation and application examples	1	2
b.	VO Alternative Treatments and Healing Methods II – Traditional Chinese Medicine Historical overview and nomenclature of TCM drugs, discussion of important examples based on patterns, falsifications, introduction to Chinese medicine and their therapeutic procedures	1	2

c.	VO Phytopharmaceutics – from Cultivation to Finished Medicine Products Knowledge of evidence-based herbal medicines including their risk-benefit assessment, pharmacological and clinical research of corresponding products and their production (seed, cultivation, production)	1	2
d.	VU Phytopharmaceutics – Quality Control Theoretical foundations and specific requirements for ensuring the quality of herbal medicinal products, modern analytical techniques and testing methods, practical application of these methods to real samples	1	1.5
Total		4	7.5
Learning Outcomes: Students are able to explain the theoretical foundations of alternative treatment methods such as homeopathy and Traditional Chinese Medicine and to explain the materials and manufacturing instructions used. They have insights into the industrial production process of herbal medicines, the requirements for the quality of starting material and end product as well as their practical testing in the laboratory using chromatographic methods.			
Prerequisites: positive completion of compulsory module 2			

7.	Elective Module: In-Depth Aspects of Pharmaceutical Technology	h	ECTS-Credits
a.	VO Industrial Research and Product Development Industrial development and production of pharmaceutical and food products including regulatory bases, process analytics, process engineering, marketing and property rights	2	5
b.	VU Different Pharmaceutical Forms and Medicine Products Theoretical basics, development and practical application of special drug forms and medical products (e.g. bandages, adhesive tapes)	2	2.5
Total		4	7.5
Learning Outcomes: The students gain insight into various pharmaceutical technological topics of industrial research and product development. They capture the theory and practical application of special dosage forms and selected medical devices			
Prerequisites: positive completion of compulsory module 5 and 6			

8.	Elective Module: Experimental Cancer Chemotherapy	h	ECTS-Credits
a.	VO Development and Effect of Antitumor Agents Basic aspects of tumourigenesis and tumour treatment are discussed. In addition to the principles of action, drug targeting and targeted therapy are dealt with based on selected drugs.	2	5
b.	UE <i>In vitro</i>-Testing and Analytics of Established and Potential Antitumor Drugs Preclinical studies of potential antitumour agents: growth inhibition on various tumour cell lines; quantification of receptor drug and enzyme drug interactions; tumour cell uptake and DNA binding	2	2.5
Total		4	7.5

	<p>Learning Outcomes: The students understand the mechanisms (e.g. relationship of structure and mutagenic / anti-tumour effect) of tumour development and treatment as well as the concept of a target-oriented drug design (drug targeting and prodrug concept) to minimize side effects. They are able to retrieve the relevant drug classes. They are familiar with preclinical methods of investigation, <i>in vitro</i> and <i>in vivo</i> methods for the evaluation of antitumour agents and the course (or replacement) of animal experiments.</p>
	<p>Prerequisites: positive completion of compulsory module 4</p>

§ 8 Master's Thesis

- (1) During the Master's Programme a Master's Thesis amounting to 22.5 ECTS-Credits must be written. The Master's Thesis is a scientific piece of work that proves the ability to work on a scientific topic independently and in a justifiable way in terms of content and methodology.
- (2) The topic of the Master's Thesis must be taken from the core subjects of pharmacy (pharmacognosy, pharmacology & toxicology, pharmaceutical chemistry and pharmaceutical technology).
- (3) The written announcement of the topic and the supervisor requires positive evaluation of the compulsory module 11.
- (4) Students have the right to suggest the topic for their Master's Thesis or to select from a number of suggestions.
- (5) Students are entitled to write their Master's Thesis in a foreign language if the supervisor agrees to it.

§ 9 Examination regulations

- (1) Modules are evaluated by module examinations. Module examinations are examinations that proof the knowledge and skills acquired in a module. With successful completion of all part of the module examination, the respective module is passed.
- (2) Courses of modules are evaluated by course examinations. Course examinations are
 1. examinations that assess the knowledge and skills covered in the lectures in which course assessment is based on a single examination at the end of the course.
 2. Courses with continuous assessment, for which course assessment is based on regular written and/or oral contributions by participants.
- (3) The compulsory module "Master's Thesis Defense" is evaluated by an oral examination before an examination board. The examination board consists of three persons.

§ 10 Academic degree

Graduates of the Master's Programme Pharmacy are awarded the academic degree of „Magistra pharmaciae“ or „Magister pharmaciae“, short „Mag. pharm“.

§ 11 Coming into force

- (1) This curriculum comes into force on 1 October 2018.
- (2) The modification of the curriculum published in the University of Innsbruck Bulletin of 16 November 2018, Issue 6, No 81 comes into force on 1 October 2019.