University of Tartu Faculty of Medicine Department of Pharmacy



SELF-EVALUATION REPORT

for the accreditation of curricula

80419 (8896212)	Pharmacy (Bachelor and Maste	er`s integrated studies)
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2707 (8505202) Pharmacy (Doctoral studies)

80361 (8896212) Pharmacy (Doctoral studies)

Approved by:

:

Head of the Working Group	Prof. Peep Veski	Signature	Date
Dean of the Fac of Medicine	culty Prof. Toomas Asser	Signature	Date
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Tartu 2008

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DESCRIPTION OF THE PROCESS OF COMPILING THE SELF-EVALUATION REPORT

Steering Group (Group) was established by the Dean of the Medical Faculty (Faculty) for preparing the self-evaluation report in March 2008. The Group comprised of the following members:

Peep Veski, Ph.D. (biol.), *Dr. Pharm.*, Professor of Pharmaceutical Technology and Biopharmaceutics, Head of the Department of Pharmacy

Vallo Matto, Dr. Med., Senior Research Fellow, Department of Pharmacy

Ain Raal, Ph.D. (pharm.), Senior Lecturer of Pharmacognosy, Department of Pharmacy

Daisy Volmer, MSc. (pharm.), Lecturer of Social pharmacy, Department of Pharmacy

Taavi Lehto, student, Pharmaceutical Society of the University of Tartu

The Self-Evaluation Report (Report) was compiled as a result of close cooperation, intensive work and discussion throughout the process. Tasks were divided between the members of the Group. Each member carried out extensive discussions and computer network based information and opinion collection. Special queries among students and teaching staff were carried out. The Group wrote the final Report on the basis of collected information and opinions. The final Report will be presented on the homepage of the Department of Pharmacy (http://www.med.ut.ee/farmaatsia *Evaluation of Pharmacy Training*). The main statements of the Report will be discussed by the Council of the Faculty.

APPENDIX I. QUESTIONNAIRE FORM FOR UNDERGRADUATE STUDENTS

APPENDIX II. ANALYSIS OF THE QUESTIONNAIRE FOR UNDERGRADUATE STUDENTS

APPENDIX III. QUESTIONNAIRE FORM FOR THE ACADEMIC STAFF OF THE DEPARTMENT OF PHARMACY

APEENDIX IV. ANALYSIS OF THE QUESTIONNAIRE FOR ACADEMIC STAFF OF THE DEPARTMENT OF PHARMACY

1. INTRODUCTION

1.1. THE MISSION OF THE UNIVERSITY OF TARTU

The goal of the university, as defined in its Statutes, is to promote research and knowledge in all fields of its activities, to provide higher education based on professional research and academic study at all levels and to offer services in research, development and education.

The mission of the University of Tartu has been determined in the University of Tartu Strategic Plan, approved by the University Council on December 19, 2003 by the following statement: as a national university, taking together different science areas, the University of Tartu is to act as the guardian and advocate of a highly educated Estonia through internationally acclaimed research and the provision of research based higher education. Five specific "breakthrough" areas are listed in this Plan for the development of the university between the years of 2003 and 2008: strengthening of the role of the national university, internationalisation, securing the continuity of top level national intelligentsia, harnessing to good effect the intellectual capital of the university, improving the quality of teaching and learning.

APPENDIX V. STATUTES OF THE UNIVERSITY OF TARTU (available on CD and on-line)

APPENDIX VI. THE UNIVERSITY OF TARTU STRATEGIC PLAN 2008 (available on CD and on-line)

1.2. BRIEF HISTORY OF THE UNIVERSITY OF TARTU

On 30 June 1632, King Gustav II Adolf of Sweden signed the Foundation Decree of Academia Dorpatensis, which enables us to mark the beginning of our university's history. The following stages can be observed in the history of the University of Tartu.

1632-1710 Academia Dorpatensis (Tartu University during the Swedish times)

* Academia Gustaviana 1632-1665

* Academia Gustavo-Carolina 1690-1710

1802-1918 Kaiserliche Universität zu Dorpat (The Imperial University of Tartu) * Imperatorskij Jur'evskij Universitet 1893-1918

1919-1940 Tartu University of the Republic of Estonia

1940-1941 Tartu State University

1942-1944 Tartu University of the Estonian Self-Government under Nazi German Rule (Ostland-Universität in Dorpat)

1944-1989 Tartu State University

Since 1989 – The University of Tartu

APPENDIX VII BRIEF HISTORY OF THE UNIVERSITY OF TARTU

1.3. THE ESTONIAN SYSTEM OF HIGHER EDUCATION

All people with secondary education have the right to apply for the curricula of higher education offered in universities, institutions of professional higher education and vocational educational institutions. As of academic year 2002/2003, it is possible to attend studies based on the curricula of professional higher education, Bachelor's study, Master's study, Doctoral study and integrated curricula of Bachelor's and Master's study in Estonia.

It is possible to choose between two types of curricula depending on the first level of higher education: - theory-based curricula of Bachelor's study in order to develop practical skills on the basis of theoretical principles;

- practice-based curricula of professional higher education in order to develop theoretical knowledge primarily on based on practical needs. Practical work forms minimum 30% of the curriculum.

The nominal duration of professional higher educational study is 3-4.5, with the fixed study load of 120 - 160 credit points (180 – 240 credit points in European Credit Transfer System (ELTS)) in the curricula.

The nominal duration of Bachelor's studies is three to four years and the study load fixed in the curricula is 120 - 160 credit points (180 - 240 credit points in ECTS).

Professional higher educational study and Bachelor's study are both first level studies and a person who has completed the studies has the right to continue his or her studies in Master's study.

The nominal duration of Master's study is one to two years and the study load fixed in the curricula is 40 - 80 credit points (60 - 120 credit points in ECTS). The nominal duration of Bachelor's and Master's study is at least five years in total and the study load fixed in the curricula is 200 credit points (300 credit points in ECTS).

The integrated Bachelor's and Master's study curricula includes the nominal duration of medical and veterinary training of six years and the study load fixed in the curricula is 240 credit points (360 credit points in ECTS). The nominal duration of dentistry training, pharmacist training, architectural studies, civil engineering studies and teacher training for class teachers is five years and the study load fixed in the curricula is 200 credit points (300 credit points in ECTS).

The nominal duration of Doctoral study is three to four years and the study load fixed in the curricula is 120 - 160 credit points (180 - 240 credit points in ECTS).

Institutions of higher education

The higher education system in Estonia has two branches with different types of educational institutions.

University is a research, development, study and cultural institution. The activities of universities address implementation of basic and applied research on international level whereas one of the preconditions is offering higher education aimed at theory and research on the second and third level.

Institutions of professional higher education and, in lesser extent some vocational educational institutions educate highly motivated specialists with good professional skills on the first level of higher education, taking into account the labour market needs. Prerequisites being flexibility and practice-orientation of curricula and close cooperation with entrepreneurs, professional associations and other social partners connected with the field. As an exception, the Government may permit to open a curriculum in Master's study provided in an institution of professional higher education.

Opportunities to acquire higher education have also been established in the private sector where educational institutions operate.

Until the year 2002, the number of institutions offering higher education increased together with the number of students. The increase at the beginning of 1990's was the result of the establishment of state institutions of professional higher education on the basis of vocational educational institutions, as well as the establishment of numerous private institutions of higher education.

Students

In comparison with the academic year 1993/1994, the number of students studying according to higher education curricula has increased 2.7 times in the academic year 2006/2007 – from 25,000 to 69,000. Students are accepted to both the student places that are formed on the basis of SCE and the ones that are not paid for from the state budget funds. Over the years, the proportion of students studying in SCE student places and the ones who need to pay tuition fee has significantly changed. In the academic year 2006/2007, the number of state-commissioned student places amounted to 45% of the total number of students, 13 years earlier the corresponding figure was 93%.

The fields of study of national priority and with increasing employment rates:

- engineering;
- manufacture and processing (different industrial technologies and products);
- IT sciences;
- environmental protection (environmental and geotechnologies);
- life sciences (biotechnology, biomedicine);
- services.

In Estonia, the system of higher education is run by the Ministry of Education and Research. General requirements for higher education are set by the Standards of Higher Education (2002). The provision of higher education is regulated by several laws (the Universities Act, the Private Schools Act, etc.).

APPENDIX VIII. ESTONIAN EDUCATIONAL SYSTEM. Copyright: European Commission. Directorate General for Education and Culture, 2008 (available on CD and on-line).

1.4 THE STRUCTURE OF THE UNIVERSITY OF TARTU

The University of Tartu (UT) is a legal person governed in its daily operations by the provisions of the University of Tartu Act, the Universities Act, the University of Tartu Statutes and other legislation.

The university comprises academic, administrative and support structures.

Today, there are ten faculties at the UT: Theology, Medicine, Philosophy, Exercise and Sports Sciences, Natural Sciences and Technology, Economics and Business Administration, Mathematics

and Computer Sciences, Education, Social Sciences and Law. The constituent parts of a faculty are departments, institutes or other structural units in accordance with the statutes of the faculty. At the head of a faculty is the dean while the highest decision-making body is the council of the faculty.

There are also 5 colleges: Pärnu College, Türi College, Narva College, Eurocollege and Viljandi Culture Academy.

The teaching staff of the university involves 943 persons, among them 160 full-time professors, 192 docents and 575 lectures, assistants and teachers (31.12.2007).

In the academic year of 2007/2008 (as of 31.12.2007) the student body of the University of Tartu comprised 16994 students, of which 11868 were regular students and 5126 Open University students. Female students made up nearly two thirds of the student body. In 2006/2007 the student body included 586 international students originating from 40 countries.

APPENDIX IX. THE STRUCTURE OF THE UNIVERSITY OF TARTU

1.5. PRINCIPLES AND ORGANISATION OF QUALITY ASSURANCE AT THE UNIVERSITY

The University of Tartu regards the assurance of the quality of educational work as one of its strategic tasks. The development plan until 2008 emphasises that the University of Tartu **assures a high level of education in all the forms of study**, offers new well-prepared courses, constantly updates the contents of the teaching materials, improves the study environment and employs modern methods of study. The university involves new target groups by creating flexible study opportunities for foreign students and students undertaking self-education in traditional and new forms of study.

Among other things, the development plan emphasises the need for introducing an integrated quality assurance system. In the evaluation of the work of the academic staff it is deemed necessary to give more consideration to the quality of the educational work, including feedback from students, graduates, their employers and other stakeholders.

From September 1 2006, the university started to implement programme-based organisation of study, the aim of which is to guarantee quality of study process, flexibly meet the needs of society and assure sustainability in curriculum development. Programmes are comprehensive education service packages which include curriculum development, the substantive organisation of study, the necessary marketing activities, the accompanying support services and programme administration.

Programmes are led by Programme Managers who coordinate the study process and curriculum development within the programme, the programme related financial and marketing activities and information exchange by guaranteeing the effectiveness and quality of the curriculum. To achieve this, the advisory bodies of programmes (Programme Councils) include the representatives of students and employers. The tasks of Programme Councils include the preparation of a strategic development plan, setting the goals of the principle activities, counselling a Programme Manager and evaluating the programme effectiveness.

In the autumn 2006, the University Council approved a new Curriculum Statutes. The new statutes introduces two major changes: development of learning outcome based approach for curricula and annual internal evaluation of curricula. Internal evaluation is carried out by a Programme Manager and the Council, with an aim to underline the strenghts and weaknesses across a curriculum and generate a further action plan for improvements to be introduced. By providing important input for accredidation preparation, internal evaluation plays a substantial role in the quality assurance system.

On a regular basis (each semester) an opinion poll, "Evaluation of the teaching and the subject courses", is conducted among the students, on the basis of which a corresponding report will be prepared by the Office of Academic Affairs. The evaluation result also serves a basis for an annual award to be given to the best lecturer of a year. From the autumn semester 2007, students will be asked to provide feedback on the curriculum they are enrolled in.

In addition to the activities evaluating the quality of the educational work internally, the university also considers it important to get feedback from its graduates and their employers. The Career Service

conducts annual polls among the former students of the university who, by the time of the poll, have worked approximately six months. The graduates shall evaluate their initial copying at the labour market and the relevance and level of the knowledge and skills obtained from the university, and they are able to make suggestions on how to improve what has been done so far. The results of the poll are made available both to the faculty and the wider public (via the web).

In the beginning of 2007, a survey among employers was conducted to find out their expectations towards graduates' competences and how holders of a three-year bachelor's programmes cope at the labour market.

Without a doubt, employers need to be involved to a greater extent than before in the preparation of the curricula, in particular in the widening of the practice possibilities but also in the conduction of the educational work in general. It is therefore necessary to do more thinking over how to enhance employer interest in the processes going on at universities.

The responsibility for cooperation with employers in the development of the curricula lies with the faculties.

Of decisive importance in the assurance of the quality of educational work is the high academic level of the faculty. Academic positions are filled through competition and employment contracts are fixed-term contracts. After the end of the election term all the university teachers can take a so-called semester off, during which they maintain their salary while having no teaching duties. On a regular basis, refresher training is conducted for university teachers on the possibilities of using new teaching methods (incl. the web-based learning environment WebCT), and a methodology course "Teaching at a higher education establishment" has been launched on the initiative of the Faculty of Education.

The university considers the existence of a student counselling system a prerequisite to the assurance of the quality of educational work. A counselling service concerning the general organisation of the educational work and the related documentation is provided by the dean's offices of all the faculties; the Office of Academic Affairs has employed a student counsellor. Freshmen are supported by tutors (students of senior years). A career service has been established for career-related counselling of students, which, apart from counselling, offers relevant training to students and notifies them of job offers. There is also a psychologist at the service of the students.

1.6. ORGANIZATION AND MANAGEMENT OF THE FACULTY OF MEDICINE

The history of the Faculty of Medicine begins in 1632 when Academia Gustaviana was opened. The Faculty of Medicine was one of the four original faculties when the University was founded. After the University was re-established in 1802, the faculty became one of the leading medical schools in Russia. Well-known scientists working at that time in the Faculty were K-E. v. Baer, O. Schmideberg, N. Pirogov, E. Kraepelin and others.

In the Republic of Estonia (1.3M inhabitants) the Faculty of Medicine is the only institution providing higher medical education. At present, students in the faculty can study medicine, dentistry, pharmacy, public health, neurosciences, and nursing. Courses in medicine take six years to complete, in dentistry and pharmacy five years, in nursing up to three years, and the public health master courses and neurosciences Ph.D. courses last three, and four years, respectively. Undergraduate studies in medicine and dentistry may be followed by period of residency (up to five years) after which the physicians or dentists become specialists in their respective field. The basic and master studies are followed by several Ph.D. programmes.

Though the Faculty of Medicine is certainly the leading institution of Estonian healthcare system, the internationalization and European dimension is always considered as a priority. This is reflected on the one hand in the harmonization of the curricula, on the other hand in the continuously increasing research and development cooperation with foreign institutions.

The major objectives of the Faculty of Medicine are:

- implementation of the faculty strategic plan
- creation and execution of the curricula and management of teaching and tuition along those curricula
- implementation of the continuing education courses
- organization and support of research and development

- assuring of the sustainable development, including academic personnel, of the faculty
- development of the faculty's infrastructure
- execution of other duties along the University of Tartu regulations

In 2008 altogether 1432 students studied at the Faculty of Medicine, among them 1220 in undergraduate, 212 in master programmes and in Ph.D. programmes. There are also 518 physicians in the residency programme.

The language of instruction at the Faculty is Estonian. However, English is used as the language of instruction in the first two years in pre-clinical medicine subjects for students of NID studies who study on a contractual basis (foreign students - "English Group").

The Faculty has teaching staff of 224 persons and 134 researchers, among them 31 professors. It consists of three independent structural units, nine preclinical and 17 clinical departments: Dean's Office, Vivarium (Animal Department), Centre of Continuing Medical Education (ARTK), Departments of Biochemistry, Pharmacology, Physiology, Microbiology, General and Molecular Pathology, Anatomy, Pathological Anatomy and Forensic Medicine, Public Health, Pharmacy, Haematology and Oncology, Cardiology, Anaesthesiology and Intensive Care, Surgery, Family Medicine, Pulmonology, Paediatrics, Dermatology, Obstetrics and Gynaecology, Neurology and Neurosurgery, Psychiatry, Internal Medicine, Ophthalmology, Oto-Rhino-Laryngology, Sports Medicine and Rehabilitation, Traumatology and Orthopaedics, and Stomatology. The clinical departments are integral parts of Tartu University Clinics, which, in addition to teaching of the students, is responsible also for medical care of the patients and clinical scientific work.

Along to the University of Tartu strategic plan, research is considered as one of the key activities by the Faculty of Medicine. In 2001-2008 at the Faculty of Medicine 87 Ph.D. thesis are defended, all based on peer-reviewed scientific articles published in leading scientific journals. In 2001 the Centre of Excellence for Molecular and Clinical Medicine was created.

Most of the study places in the Faculty of Medicine are state commissioned and financed by the Ministry of Education and Research on the basis of the actual need of healthcare professionals in the Republic of Estonia. There is also an option to study on the non-state commissioned study places financing the studies by themselves.

The Faculty of Medicine is led by the Faculty Council (42 members) and Dean's Office. The Faculty Council is responsible for the strategic planning and leading of the faculty, including deciding on the financial resources and the elections and appointments of the academic staff. The daily life of the faculty is administered by the Dean's Office, lead by the Dean, three Vice Deans for Research, Teaching, and Residency, and Dean's Office officials.

The financial resources of the Faculty of Medicine origin from four major (but not exclusively from those) sources

- fees paid by the government for the state commissioned study places
- fees paid by the students
- grants from various sources and foundations
- contract based payments

The Faculty of Medicine budget for 2007 was 18.3M EUR.

The faculty homepage is <u>http://www.med.ut.ee</u>

APPENDIX X. THE STRUCTURE OF THE FACULTY OF MEDICINE

APPENDIX XA. SELF-EVALUATION REPORTS OF THE DEPARTMENTS OF THE FACULTY OF MEDICINE TEACHING PHARMACY MASTER STUDENTS (available on CD and on-line)

1.7. ORGANIZATION AND MANAGEMENT OF THE DEPARTMENT OF PHARMACY

Department is a structural unit incorporating professionally close institutions and organises teaching and research according to its programme(s). Head of the department is appointed amongst professors (or senior lecturers in special cases) of the department by the Dean of the faculty for a three years period. Competence of the Head of the Department includes administration and representation of work of the department, management and responsibility for the budget and recourses, and securing progress and development of the department.

Ordinary teaching and research staff is endorsed according to suggestions from Deans of the Faculties or Heads of university institutions. The number of teaching staff in a structural unit depends on the auditory teaching load. The nominal teaching load is 128 h, 224 h, 288 h, and 320 h for a professor, senior lecturers, lecturers, and assistant, respectively.

Qualification requirements for teaching and research staff have been enacted in the Statutes of the University of Tartu and University of Tartu Election Rules. Professors are elected for 5 years periods by the University Council.Senior lecturers, lecturers and assistants are elected by the Faculty Council for 5, 4, and 3 years periods, respectively.

Since February 1998, the Head of the Department of Pharmacy is Professor Peep Veski. From the same time up to 2003, Prof. Veski had been the Vice-Dean of the Faculty of Medicine. Representation of Pharmacy in the Faculty administration is not stated in the statue of the Faculty. Therefore, the Head of the Department of Pharmacy does not automatically belong to the Faculty administration.

Academic staff was asked about the satisfaction of the management of the Department. 92% of the respondents were satisfied with the management.

Management of the Department of Pharmacy is based on the Developmental Plan of the Faculty of Medicine. Budget of the Department of Pharmacy is coming from following sources:

- <u>Contribution of the Government</u>, based on the annually fixed number of students, basic costs for one student (from 2008 this is ca 2100 EUR), and coefficient of the speciality (2.1 for pharmacy).
- <u>Fees paid by students</u> on other than governmentally-funded positions including those who study in the Open University. From 2008 fee paid by students is ca 2550 EUR/year.
- <u>Research funding from the Estonian Ministry of Education.</u> The Board of Scientific Competency awards perspective projects for 5 years. Annual funds can be different and are awarded individually for each year. In reality, they funded projects do not cover all fields of medicine. The Department of Pharmacy held one such "target financed" project "Chemical, physicochemical and biopharmaceutical investigations of pharmaceutical formulations determination and improvement of quality " 2002 2006.
- <u>Research funding from the Estonian Science Foundation.</u> The annual decision of awarding the grants is made by the Board of the Foundation. PhD K. Kogermann applied grant in 2008.
- <u>Baseline funding</u> is a new instrument, introduced in 2005. The proportion of baseline funding in overall public financing will increase gradually. The purpose is financing R&D institutions on the basis of research quality in order to support the development and initiative research of R&D institutions. Also, it is aimed for co-financing of cooperation projects, international and local, between academia and industry. There are not any specific guidelines for spending, thus the institutions are responsible. Senior research fellow V. Matto is the holder of the baseline funding.
- <u>Enterprise Estonia's grants</u> for implementing applied research projects have been designed for the purpose of research and studies, the results of which can be used in the development of new or existing products, technologies or services. Senior lecturer A. Raal is the holder of Enterprise Estonia's grant.
- <u>Contracts with companies</u>. Department of Pharmacy will sign contract with Tallinn Pharmaceutical Plant in autumn 2008. Field of investigation: Development of analytical methods for determination of API-s, excipients and impurities of ingredients in semisolid dosage forms.

According to the opinions of the academic staff of the Department of Pharmacy, 58% noted the leading role of the department in the pharmacy sector in Estonia. The same percent of the academic staff of the department agreed that the imago of the Department of Pharmacy is good or rather good.

The most important factors for improvement of imago are increased number of scientific publications, increased number of PhD students, modern equipments, novel teaching methods, professional competency and collaboration with other departments at the University of Tartu and with different parties within the pharmacy sector.

Department of Pharmacy homepage is www.med.ut.ee/farmaatsia

2. PHARMACY EDUCATION IN ESTONIA

In 2008, there are 1.34 million inhabitants in Estonia. Currently there are:

- Community pharmacies 509
- Hospital pharmacies 29
- Veterinary pharmacies 25
- Wholesale firms 55 (2 larger companies)
- Manufacturing enterprices 27
 - human medicines 6 licences
 - veterinary medicines 1 licence
 - herbal drugs 7
 - blood preparations 4
 - medicinal gases 2
 - others 7

In May 2008, there were 1055 registered pharmacists and 665 registered pharmacy assistants in Estonia (http://www.tervishoiuamet.ee).

The first connections of teaching pharmacy date back to the foundation of the University of Tartu in 1632. Already in 1842, the independent professorship of pharmacy was established at the University of Tartu. Today two curricula have been accredited. The Integrated Bachelor's and Master's Curriculum (further refered as master or undergraduate studies) lasts for 5 years (300 ECTS) and doctoral programme 4 years (240 ECTS). Since 1945, pharmacy assistants have been educated in the Tallinn Medical School. The graduates from the Tallinn Medical School obtained vocational education. In 2006, the Tallinn Medical School was renamed the Tallinn Health College. Since 2002, the College has adjusted curriculum as professional higher education curriculum. The studies last for 3 years. The quota for admission to the state commissioned places in the recent years was 30. The obtained education corresponds to BA according to the three cycle system of Bologna Declaration. The graduates of Tallinn Health College can continue their education in the Open University at the University of Tartu. The Open University works on the distance learning principle and is not state financed. The precondition to continue the studies at the University of Tartu is working on professional position during the studies. The studies in the Open University last for four years.

There are two possibilities to obtain PhD: the first possibility takes 11 years (3 years bachelor programme at the Tallinn Health College + 4 years master programme in the Open University at the University of Tartu + 4 years doctoral programme at the University of Tartu). The other possibility takes 9 years (5 years master programme + 4 years doctoral programme, both at the University of Tartu).

3. THE OBJECTIVES OF THE DEPARTMENT OF PHARMACY

The Department of Pharmacy is the only institution in Estonia giving the education in pharmacy at university level. Therefore, the mission of the Department of Pharmacy is to prepare highly qualified pharmacists but also to promote research and assist the organisation and development of the whole pharmacy system in Estonia. To fulfil this mission, the Department sees its goals as follows:

- to fill the state commission for educating pharmacists and to organise and conduct pharmacy studies in the Open University,
- to provide all pharmacy students with an education based on modern scientific concepts and international standards,

- to conduct doctoral studies in pharmacy in order to provide reproduction for academic and research specialists,
- to participate actively in development and promotion of all fields of pharmacy and to assist expertise and decisions made at the governmental level,
- to participate in work of international pharmacy organisations and committees, and promote international collaboration,
- to participate in process of improving professional qualification and competency of pharmacists and in work of attesting committees,
- to develop professional terminology in Estonian language.

4. DESCRIPTION OF THE CURRICULA

At the University of Tartu the design of curricula has to conform to the rules laid down by several normative regulatory documents:

Standard of Higher Education

Study Regulations

Statute of Curriculum

The doctoral curricula shall also be governed by the **Statutes of Academic Degrees** of the University of Tartu.

APPENDIX XI. STANDARD OF HIGHER EDUCATION (available on CD and on-line, only in Estonian).

APPENDIX XII. STUDY REGULATIONS OF THE UNIVERSITY OF TARTU (available on CD and online).

APPENDIX XIII. STATUTE OF CURRICULUM (available on CD and on-line).

APPENDIX XIV. STATUTES OF ACADEMIC DEGREES (available on CD and on-line).

4.1. HISTORY OF TEACHING OF PHARMACY AT THE UNIVERSITY OF TARTU

There are three distinguishable periods in the history of teaching pharmacy at The University of Tartu.

I period: form 1632 to the end of the 18th century.

Il period: Period of Russian tsarism from the beginning of the 19th century until 1918. Ill period: Pharmacy education at Estonian university starting from 1918.

APPENDIX XV. HISTORY OF TEACHING OF PHARMACY AT THE UNIVERSITY OF TARTU

4.2. CHARACTERISATION OF CURRICULUM: PHARMACY MASTER CURRICULUM

The objective of the Pharmacy Master Curriculum is to train pharmacists having the following knowledge and skills:

- adequate knowledge of medications and the substances used in manufacturing medicinal products
- adequate knowledge of pharmaceutical technology and the physical, chemical, biological and microbiological testing of medicinal products
- adequate knowledge of the metabolism and the effects of medicinal products and the action of toxic substances and the use of medicinal products
- adequate knowledge to evaluate scientific data concerning medications in order to be able to supply appropriate information on the basis of this knowledge
- adequate knowledge of the pharmaceutical legislation

The graduates of pharmacy studies in master level are able to perform the following activities:

- preparation of different dosage forms
- testing of medicinal products in the laboratory

- storage, preservation and distribution of medicinal products at the wholesale stage
- preparation, testing, storage and supply of medicinal products in community pharmacies
- preparation, testing, storage and dispensing of medicinal products in hospital pharmacies
- providing information and advice on medicinal products

Stationary studies in pharmacy are carried out at two levels: undergraduate studies – Pharmacy Master Curriculum (5 years) and doctoral studies (4 years).

Extramural studies in pharmacy are carried out in the Open University by a curriculum similar to undergraduate studies. Only assistant pharmacists graduated from the Tallinn Health College/Tallinn Medical School can attend these studies. Before admission they are accredited for prior experience and knowledge.

Pharmacy Master Curriculum, adopted by the Council of the University of Tartu on June 6, 1997 was modified in 2003 and 2007.

The main differences in the 2003/2004 curriculum compared to the curriculum of 1997 are:

- higher proportion of medicinal subjects
- implementation of pharmaceutical terminology, pharmaceutical excipients, professional ethics, genetics, pharmacoepidemiology and pharmacoeconomics, physicochemical analysis of medications (physical pharmacy), biotechnology, drug toxicology as obligatory subjects into the curriculum
- increasing the duration of in-service practice (pharmacy practice) up to 25 weeks
- prolonged time for research projects

The most important changes in the curriculum 2007/2008 compared to the 2003/2004 curriculum are:

- proportional decrease in auditorial work and increase in independent work
- implementation of the subjects of clinical pharmacy primary care medicine, clinical microbiology, laboratory medicine, clinical pharmacology into the curriculum
- decreasing the proportion of chemistry-based subjects
- increasing the proportion of pharmaceutical technology related subjects
- implementation of Drug Metabolism as an independent subject into the curriculum

Compulsory subjects have been divided into groups according to the principles proposed by prof. P. Bourlioux in the World Congress of Pharmacy Education, April 7-9, 1998, New Orleans).

SUBJECTS	1997/1998 (%)	2003/2004 (%)	2007/2008 (%)
Chemical	32	23	17
Physical/mathematical	7	5	4
Biological	13	13	13
Medical	25	27	30
Pharmaceutical technology	12	20	24
Pharmaceutical legislation			
and social pharmacy	11	12	12

Fourty five percent of the respondents of pharmacy students' survey considered excess of chemical subjects, 65% stressed insufficiency of medical subjects and 45% of social subjects. Eighty percent of the respondents are satisfied with the proportion of pharmaceutical technology related subjects and biological subjects. Majority of the pharmacy students participated in the survey, studied according to the 2003/2004 curriculum. In the curriculum modified in 2007 the proportions of "chemistry" and "medicine" have changed.

In the survey of the academic staff of the Department of Pharmacy, excess of chemical subjects was mentioned by 36% of the respondents and insufficiency of medical subjects by 55% of the participants.

Pharmacy Master Curriculum lasts for 5 years and during this period the required sum of the compulsory, elective and optional subjects, research project, and pharmacy training should be 300 ECTS. This is divided proportionally between the 5 years – 60 ECTS per year. In the 2007/2008 curriculum 1 ECTS = 13 hours classroom work + 14 hours independent work. In the curriculum 2003/2004 1 ECTS = 16 hours classroom work + 11 hours independent work.

According to the pharmacy students' survey, in one week 57% of the respondents have 21-30 hours of auditory work and 44% 11-20 hours of independent work. In general, 72% of students study 30 or more hrs per week that refers to a normal weekly workload.

In average 75% of the respondents regarded proportions between theory versus laboratory work, auditorial versus independent work and study periods versus free time during a year appropriate. Duration of pharmacy practice was found appropriate by 40% and too short by 57% of students.

In the 2007/2008 curriculum, compulsory, elective and optional subjects cover 90, 6, and 4%, respectively. There are 41 compulsory subjects with average capacity of 6.5 ECTS. There are in total 29 exams in the curriculum, mainly in written form. The total number of preliminary exams is 17. In the pharmacy students' survey there were also questions concerning proportion, number of and satisfaction with the teaching quality of elective and free subjects.

Fifty six percent of respondents would increase the number of elective subjects, although the proportion and satisfaction with the teaching quality of elective and free subjects was mainly evaluated as sufficient.

APPENDIX XVI. PHARMACY CURRICULUM, MASTER PROGRAMME SINCE 2003

APPENDIX XVII. PHARMACY CURRICULUM, MASTER PROGRAMME SINCE 2007

APPENDIX XVIII. COMPULSARY SUBJECTS TAUGHT IN THE DEPARTMENT OF PHARMACY

APPENDIX XIX. COMPULSARY SUBJECTS TAUGHT IN THE FACULTY OF MEDICINE (full information available on CD and on-line).

APPENDIX XX. COMPULSARY SUBJECTS TAUGHT IN OTHER FACULTIES (full information available on CD and on-line).

APPENDIX XXI. ELECTIVE SUBJECTS IN THE PHARMACY MASTER PROGRAM (2008/2009)

4.3. OPENING, MANAGING AND CHANGING OF THE CURRICULUM

The rules are fixed in the Statute of Curriculum of the University of Tartu.

Preconditions of **opening a curriculum** are university's sufficient academic and material resources and clearly reasoned need for opening a curriculum. Prerequisite for opening a PhD curriculum is the existence of positively evaluated research field related to the curriculum in the university.

In order to open a curriculum, the faculty council that wishes to open it, presents to the Council of the University a proposal of opening a curriculum together with an application with annexes. In order to open a curriculum in a foreign language, the proposal may be written in English. Proposal for a curriculum that is shared by institutions or joint curriculum may be presented jointly.

Management of a curriculum is programme-based. The programme includes curriculum development, lays down the organisation of activities related to teaching and study, financial development, auxiliary support services, etc.

The aim of the programme-based study is to ensure the quality of teaching, react flexibly to the needs of the society and to ensure the development of the curriculum in a consistent manner. Dean coordinates the programme-based study in the faculty.

Programme Manager is directly responsible for the programme. The Programme Manager coordinates the study according to the programme, as well as the development of the curriculum, programme-related financial and marketing activities and exchange of information, ensuring effective operation and quality of the curriculum. Programme Manager has reporting obligation to the head of the structural unit and/or to the Dean.

The Programme Manager convenes the Programme Council. The Programme Council sets the general aims of the programme, advises the Programme Manager regarding drafting the strategic development plan, approves the development plan and evaluates the effectiveness of operating the

programme. The council comprises representatives from the faculty, institute or educational establishment, employers and students. Membership of the council shall be approved by the Dean.

Office of Academic Affairs arranges the development of the programme-based organisation of study all over the university advises and supervises.

Programme Council of the Pharmacy Master Curriculum:

Head of the council:
Prof. P. Veski, Head of the Department of Pharmacy
Sen. lecturer (chemistry) T. Hinrikus, Department of Pharmacy
Sen. lecturer (pharmacognosy) A. Raal, Department of Pharmacy
Lecturer (social pharmacy) D. Volmer, Department of Pharmacy
Sen. lecturer (organic chemistry) U. Soomets, Department of Biochemistry
Prof. (pharmacology) A. Zarkovski, Department of Pharmacology
Assistant (clinical pharmacology and pharmacotherapy) A. Irs, Department of
Pharmacology, Vice-Director of the State Agency of Medicines
K. Sarv, responsible pharmacist, Estonian Pharmacists`Association
I. Uiboleht, Director of the Hospital Pharmacy of the Tartu University Clinics,
Estonian Society of Hospital Pharmacists
R. Unt, Director-General, Tallinn Pharmaceutical Plant
Representative of pharmacy student organization

According to the survey results, 50% of the staff of the Department of Pharmacy and 95% of the pharmacy students regarded participation of pharmacy students at the development of pharmacy master curriculum important or rather important.

Changes may be made **in the curriculum** for every academic year and the amended curriculum is the version of the curriculum for that academic year. Replacement, deletion or addition of single subject(s) in a curriculum has to be approved by the Faculty Council. Changing the curriculum and/or the name of the speciality, adding a speciality into the curriculum or closing a speciality has to be approved by the Council of the University. Version of the curriculum takes effect for the new applicants in case the changes have been made not later than the end of March of the pervious academic year and entered into the Study Information System by April 15.

If changes in the curriculum include more than 1/3 of the total number of subjects, a new curriculum shall be opened.

4.4. CHARACTERISATION OF CURRICULUM: DOCTORAL STUDIES

The four years long doctoral curriculum requires 240 ECTS, including 60 ECTS of studies and 180 ECTS of research. Doctoral studies are carried out on the basis of the Department of Pharmacy, however, collaboration is possible with preclinical departments and clinics of the Faculty of Medicine, the Faculty of Science and Technology of the University of Tartu, Estonian University of Life Sciences, Tallinn University of Technology, and collaborators in abroad. According to the possibilities to carry out the work, need for specialists with doctoral degree, and availability of appropriate supervisors, the more narrow specialities in doctoral studies are:

- pharmaceutical technology and biopharmaceutics
- pharmaceutical chemistry
- pharmacognosy
- social pharmacy

Since 2007 PhD study consists of speciality subjects (36 ECTS = obligatory subjects 16.5 ECTS + speciality subjects 19.5 ECTS), general elective subjects (12 ECTS), practice of teaching at university level (6 ECTS) and optional subjects (6 ECTS).

In conducting their research, PhD students are advised by the supervisor or the supervisor and cosupervisor(s) approved by the Council of the Faculty of Medicine. PhD students`progress in research is evaluated once an academic year by an Evaluation Board of the Faculty. The requirements established for PhD theses are set out in the Statutes of Academic Degrees (adopted by the Council of the University of Tartu on 30th of November 2007)

APPENDIX XXII. CURRICULUM OF PHARMACY – DOCTORAL STUDIES (2008)

APPENDIX XXIII. COMPULSARY SUBJECTS IN THE CURRICULUM OF DOCTORAL STUDIES (available on CD and on-line)

APPENDIX XXIV. ELECTIVE SUBJECTS IN THE CURRICULUM OF DOCTORAL STUDIES (BEFORE 2008) (available on CD and on-line)

4.5. THE CURRICULUM: STRONG SIDES

- Undergraduate programme (Master programme) in pharmacy has been compiled according to the recommendations on pharmaceutical education at higher education institutions (EU Directive 2005/36/EC) and experience of several other countries. The same time, the long traditions of teaching pharmacy have been considered
- Retaining of the course system and the logical order of subjects
- Implementation of the subjects of clinical pharmacy into the curriculum
- Implementation of interdisciplinary subjects (pharmacoeconomics, pharmacoepidemiology, biotechnology, genetics, bioethics) into the curriculum to extend professional competency of the future pharmacist
- High proportions of medicinal subjects to prepare the future pharmacist for cooperation in the health care team
- Teaching of speciality subjects starts from the 1st term
- Prolonged time for research work and more science-based studies
- Inserting elective subjects into the curriculum has given the students an opportunity to focus on specific areas according to their interest and future plans
- Doctoral curriculum comprises almost all fields of speciality

4.6. THE CURRICULUM: WEAK SIDES

- Certain field of pharmacy such as industrial pharmacy is not sufficiently represented in the curriculum
- Syllabi of some subjects are not perfectly further harmonised
- Small selection of elective subjects to choose amongst
- Small number of elective courses proposed by the Department of Pharmacy
- Doctoral studies in clinical pharmacy not available

4.7. ACTION PLAN

- Better coordination and updating of syllabi of different subjects
- To increase the proportions of the subjects dealing with the drug safety issues
- To improve and emphasise the research-based teaching, to support scientific work of the students by adding students' research work to the list of elective subjects
- To invite more visiting lectures from abroad to teach novel subjects or to support teaching of recently implemented subjects
- To enlarge collaboration during doctoral studies with other preclinical departments and university clinics, also to exploit the possibilities of the Biomedicum
- To work out the syllabus and to organise the doctoral study in the field of clinical pharmacy
- To implement elective courses concerning GMP and licensing of medicinal products formulations (compiling files for registration)

4.8. TRAINING PROCESS

At the University of Tartu, the main document regulating studies and related affairs is the Study Regulations (approved by the Council of the University of Tartu on May 26th, 2006). Councils of Faculties have right to provide complementary rules to regulate matters of studies inside their Faculties.

Master program

The organisation of studies in the Faculty of Medicine and consequently in the Department of Pharmacy, is based on course system differently from the other faculties in the University of Tartu where the studies are arranged by the subject based system. In the course system, a student is taking subjects according to the curriculum in assumption that all subjects from previous years have been taken and the exams and preliminary exams have been passed during appropriate examination periods.

The academic year at the University of Tartu consists of two terms – the fall term that starts on Monday closest to the 1st of September, and the spring term that starts on the second week of February. Both terms last for 20 weeks but the auditorial work for lasts for 16 weeks. Examination periods are in January and June for the fall and spring terms, respectively.

There are two additional periods for students to improve their results after both examination periods. After failing one and the same exam or preliminary exam the third time, the student is removed from the register. Continuation of studies on a state-commissioned student place is possible only if such place is available on the particular course. These places are publicly announced and besides the persons who want to rematriculate, non-state-commissioned students of the course can apply for these.

In the curriculum, there is a list of elective subjects. During his/her studies (during first four academic years), a pharmacy student has to take elective subjects in total for 18.75 ECTS.

The time periods when the courses are held are scattered over the whole academic year.

Optional subjects are not specified in the programme since these can be chosen amongst all subjects taught at the University of Tartu or in some other university. During his/her studies, a pharmacy student has to take free subjects in total for 12 ECTS.

To help the organisation of studies, a timetable is put together for all courses of pharmacy students (including the courses held in other faculties) for one term at a time. The timetable gives the name of subjects, and names of teachers, also time and place of the courses. A timetable for the next term is available two months before the end of the previous term in the Deans office, Department of Pharmacy and in the homepage of the Department and in the Study Information System of the University.

APPENDIX XXV. THE TIMETABLE (available on CD and on-line).

Open University

Extramural studies in pharmacy are meant for assistants of pharmacists and the courses are held during weekends (Fri-Sun) once or twice per month. During an academic year there is 250 hrs classroom work, the rest is individual work with the study materials (available on paper or on the Internet) prepared by the teaching staff. Studies are organised in a way that 2-3 subjects run in parallel cycles that end with exams. Thus, the special examination period as in stationary studies, is missing. Proportions of classroom work, seminars and laboratory works are the same as in the stationary studies. Since in this studying form people are assumed to keep up speciality work at the same time, this is accounted for training. Research works are mostly research-based, except for people who live in Tartu and wish to do experimental work at the Department of Pharmacy.

4.9. TRAINING METHODS

Lectures: In the compulsory subjects taught in the Department of Pharmacy lectures cover 32% of classroom work. The proportion of lectures has been reduced. A lecture lasts usually for two academic hours (45+45 or 90 min without a break). The structure of a lecture varies according to subjects and lecturers but often 10-15 min in the end is left for discussion and answering questions. Slides of the lectures are available on the home page of the department.

Seminars: In the compulsory subjects taught in the Department of Pharmacy seminars cover 23% of the programme. In the Department of Pharmacy seminars are held in pharmaceutical management, social pharmacy, bioethics, physicochemical analysis of drugs (physical pharmacy), biopharmaceutics,

pharmacoeconomy, pharmacoepidemiology, pharmaceutical excipients, but also in pharmaceutical chemistry, pharmaceutical technology and galenical pharmacy. A seminar group consists of maximum 20 students. The group work (small groups) and problem-based learning proportion has been increased in following subjects taught in the Department of Pharmacy: social pharmacy, pharmacoeconomy, pharmacoepidemiology, pharmaceutical excipients, bioethics and bipharmaceutics. Amongst the subjects taught in the other department the small group work and/or problem-base learning is implemented in pharmacotherapy, pharmacology, statistical analysis, primary care medicine.

Laboratory works: In the subjects taught by the Department of Pharmacy laboratory works cover 45% from classroom work, where only compulsory subjects are counted. Pharmacy practice and research work is excluded. A laboratory work group consists of maximum 16 students. Laboratory works are prepared and assisted by senior lab assistants with pharmacy education. During laboratory works, teachers also assess theoretical knowledge of students by discussions and tests.

Research Work: In the programme, fall term of the 5th year is meant for research work and concominant studies. The studies include the lecture course in "Research design" (12 hrs) and the seminar in research work. These seminars are held in all major speciality subjects taught at the Department of Pharmacy and draw together students who perform their work in the particular area. The research works have to be experimental or research-based (e.g. in pharmaceutical management, social pharmacy etc). Research works can be done outside the department on condition that the topic is related to pharmacy. Students like to choose e.g. departments of Pharmacology, Microbiology, Biochemistry, etc. In that case, the particular department (supervisors of the students) also takes responsibility for the studies concomitant to the research.

One week before the public defence, the thesis is delivered to the Heads of the Department who give their approval to admittance to the defence. According to the suggestion of the supervisor of the work, an opponent is appointed by the Head of the Department of Pharmacy.

Theses are defended in public sessions and are evaluated by a defence council appointed, according to the suggestion of the Head of the Department of Pharmacy, by the Dean of the Faculty of Medicine. The defence procedure follows the classical academic traditions: the student presents his/her results, holds discussion with the opponent, answers to the questions of the council and people present at the defence.

Thirty six percent of the pharmacy students selected research project during their studies, 23% had prior interest. For 20% of the pharmacy students the most important factor in choosing research topic was the method of the study.

Exams: During the nominal studying period a student has to take 29 exams plus the final exam, mainly in written form. More than one exam has to be taken in so called high capacity subjects (e.g. physiology, analytical chemistry, pharmaceutical chemistry, pharmaceutical technology, galenical pharmacy, etc) that are taught during several terms. All courses during any term end with an exam or preliminary exam.

Preliminary exam: Results of 17 preliminary exams are shown on the diploma supplement just as the results of exams. Preliminary exam's results are expressed in words "passed" or "failed". In terms of progressing to the next course, exams and preliminary exams are equally important. Some subjects in the programme of pharmacy such as Latin, introduction to pharmacy and history of pharmacy, pharmaceutical terminology, clinical microbiology, bioethics, immunology, etc., end with a preliminary exam.

Final exam: The exam is in written form and includes questions (mainly in form of multiple choice test) about main subjects, such as pharmacology, pharmacotherapy, pharmaceutical technology, galenical pharmacy, biopharmaceutics, pharmaceutical chemistry, pharmacognosy, pharmaceutical management, and social pharmacy. Results of the exam have to clarify how well the graduating students know drugs (synthetic and natural) and formulations, his/her ability to characterise them and give all-round information. Also, he/she has to be familiar with the criteria of quality and methods of determination and evaluation of the particular characteristics. Additionally, a good knowledge of law and pharmaceutical management in the Estonian Republic is required.

<u>Practical Training</u>: Training (37.5 ECTS = 25 weeks) takes place outside the University or in the pharmacies of Tartu University and is carried out during the spring term of the 5^{th} year.

The majority of students are trained in the two University pharmacies, located in Tartu. Only larger pharmacies with broad *ex tempore* and industrial nomenclature can serve as training bases. Partly (maximum for 3 months) the practical training is undertaken in the hospital pharmacies. The University has contracts with the training bases, and supervisors at the base are partly paid by the University. Training is administrated by teachers of the Department of Pharmacy. During the training period, students have to fill in so called "logbooks" while proceeding with their training. Training is accomplished when students have passed preliminary exams at the Department of Pharmacy. Also important is the written evaluation of every student given by the supervisors at the training base.

Besides the training described above, pharmacy students have a possibility to an elective course for second year students - "Propaedeutical Training" (3 ECTS) - which takes place in the University pharmacies and gives the students the very first picture of working in a pharmacy. Usually 100% of students join these training courses.

The majority of the fifth year pharmacy students were satisfied with practical training. Eighty eight percent of the respondents reported that practice at pharmacy provides all assignments required by the curriculum and the tutorial work carried out by pharmacy staff is sufficient. Seventy six percent of the respondents are positive that practical training assures their competency to be employed in the pharmacy field.

4.10. TRAINING PROCESS: STRONG SIDES

- Historical traditions, good experience of teaching and systematisation of subjects.
- Remaining of course-system and filling of requirements of this system in Study Regulations of the University of Tartu
- Convenient system of elective subjects
- Increasing share of seminars among training methods
- Increasing the proportion of group work and problem based learning
- Training of pharmacy students is concentrated to the Medical Campus of the University of Tartu. New building of the Department of Pharmacy is situated very close to the Biomedicum (building for preclinical departments of the Faculty of Medicine) and the University Clinics. Next year new Chemistry Building in the same campus will be opened. In the near future, pharmacy students will have all the classroom work in the same campus.
- Training process is carried out in Estonian. This enables the non-Estonians who have obtained the profession of pharmacist to find a job in the local labour market
- Training process is administered by the Study Information System of the University of Tartu
- Strong discipline of the training process

4.11. TRAINING PROCESS: WEAK SIDES

- Low efficiency of individual work in spite of good facilities (library, textbooks, study aids)
- Implementation of novel teaching methods is slow
- Insufficient participation of practicing pharmacists and the specialists from the other fields of pharmacy in the training process
- Little usage of reference literature (*Pharmaca Estica*, Martindale etc) and databases needful in the career of graduated pharmacists in the training process
- Modernisation of teaching process is limited by the lack of laboratory equipment

4.12. TRAINING PROCESS: ACTION PLAN

- To increase the share and efficiency of self-study. The prerequisite for this overcoming is the high motivation and consciousness of students, exact co-ordinating by lectures and very good availability of study materials
- To plan the elective subjects to timetable and not for the evening

- To increase the efficiency of practical training that after closing of internship (more precisely after integrating with basic course of education) it will have remarkable importance in obtaining the profession of pharmacist. In accordance with that the importance of university pharmacies has to increase
- More attention has to be paid to teaching methods of those subjects that indicate shortcomings at present
- To involve more professional pharmacists from community pharmacies, hospital pharmacies, pharmaceutical industry and also from the State Agency of Medicines in teaching process

5.PHARMACY STUDENTS

5.1. ADMISSION TO PHARMACY PROGRAMME

During the recent years, the quota for admission to state-commissioned student places has been changed as follows:

1992 – 25	1997 – 25	2002 - 30
1993 – 17	1998 – 25	2003 – 27
1994 – 25	1999 – 35	2004 – 27
1995 – 25	2000 - 30	2005 – 23
1996 – 25	2001 – 25	2006 – 27
		2007 – 27

For this year 2008, the Ministry of Social Affairs has planned the quota of 40 students and has passed the application to the Ministry of Education and Science. For the academic year 2008/2009 the number of state-commissioned places is 29. These state-commissioned student places are filled with applicants based on the results of their state examinations.

There are also non-state-commissioned student places, for which the student applicants have to pay ca 962 EUR/term. Later, those students could be admitted to the state-commissioned student places if such place becomes available on the particular course. If there is more than one applicant to one place, the choice is made based on study results of the applicants. The first pharmacy student at a non-state-commissioned student place started in 1997.

We are prepared to accept in total 48 students (3 groups of 16 students for laboratory works) but in 2005, 2006 and 2007 started 43, 44, and 42 students (state-commissioned + non-state-commissioned) respectively. The reason is probably the high fee for studies/self-financing.

During the last three years, we have had in average 5 applicants to one state-commissioned student places. Even better way to estimate the level of pharmacy student applicants is the minimum number of points needed for acceptance.

Requirements for application.

All applicants are required to be sufficiently fluent in Estonian at the time of admission to the university. The admission of international students is based on the results of state/final examinations. In the countries where students finish upper secondary school without state, centralised/ final examinations, the final grades of upper secondary school leaving certificate will be taken into account.

Two best examination results (both give 30% of the total score) of the four examinations listed below are taken into account:

* BIOLOGY * CHEMISTRY * MATHEMATICS * PHYSICS

In addition, the grade of the first foreign language (gives 20% of the total score): English, German, French or Russian and the mother tongue (gives 20% of the total score) will be taken into account for positioning an applicant on the ranking list.

During the recent years, the minimum of points for acceptance to state-commissioned student places in pharmacy has been gradually increasing.

YEAR	MINIMUM (% from POSSIBLE MAXIMUM)
2005	75
2006	75.25
2007	80.1

In the case of non-state-commissioned student places the situation is different – the minimum of points is relatively low.

YEAR	MINIMUM (% from POSSIBLE MAXIMUM)
2005	58
2006	57
2007	55

The majority of the accepted students have had pharmacy as their first priority choice. At the present time in Estonia, a student applicant can apply for two different speciality student places in one university, pointing out the first and second priority choices.

According to the pharmacy students' survey, future pharmacy students received information concerning pharmacy studies from their parents (34%), followed by friends (31%) and mass media channels (23%). The important role of the parents in choice of profession is not surprising. Pharmacy is a profession well known from generations to generations. However, the influence of friends on choosing a profession was surprisingly high.

According to the survey, 92% of the respondents had an image of the pharmacy studies before applying.

5.2.ADMISSION TO OPEN UNIVERSITY

Opening of extramural studies in pharmacy was based on the request from Estonian Society of Assistants of Pharmacists in fall 2000. Admission took place also in September 2003 and 2007.

Extramural studies (these are self financing studies) are meant for persons who a) have graduated from Tallinn Medical School/Tallinn Health College as assistants of pharmacist, and b) are working in the field of pharmacy (in pharmacies, wholesale, etc.).

Since the duration and structure of studies in Tallinn Medical School/Tallinn Health College has been the same for a long time, there was no need to differentiate the admission according to the graduation year of the applicants

YEAR OF ADMISSION	NUMBER OF ADMITTED NUMBER OF GR	
	STUDENTS	STUDENTS/NUMBER AT PRESENT
2000	74	65
2003	33	22
2007	20	16

5.3. ADMISSION TO DOCTORAL PROGRAMME

During the recent years, the quota for admission to state-commissioned student places for the Faculty of Medicine has been between 20 to 30 places per year. Student places for the pharmacy doctoral program are not fixed separately. Decision about distribution of the student places between the specialities is made in the faculty council according to the applications of the heads of departments.

Students are admitted according to ranking lists formed on the basis of the results of entrance examination (50%) and project for Doctoral thesis (50%).

A Doctoral thesis project must be attached if it is required in the curricula and entrance requirements. Content requirements for the Doctoral thesis project differ across curricula, generally, the following aspects are included:

- * dissertation topic- a brief summary of a topic and most substantial study done in a field
- * objectives of the dissertation
- * description of research methods
- * expected results their novelty and significance
- * bibliography or list of references
- * personal involvement in research or field related working experience

Evaluation of the doctoral thesis project is carried out by commission appointed by the Dean of the Faculty of Medicine.

At the beginning of the first semester, in September, each full -time doctoral student is required to submit an Individual Study Plan, which includes a plan of research, studies, use of infrastructure. The plan is approved by the supervisor.

Each doctoral student at the University of Tartu signs a study agreement which outlines topic and period of study and research, competences and expected results, responsibilities of the student and the supervisor, etc.

The attestation of PhD students takes place after every academic year.

The attestation review covers the completion of student's individual study plan last year and summarises the progress of doctoral studies.

The attestation is carried out by the commission leading by the Vice-Dean of the Faculty of Medicine.

Doctoral programme in pharmacy was opened in 1995. Last modifications in the programme were adopted by the Council of the Faculty of Medicine in May 2008.

5.4. STUDENTS

There are 152* undergraduate pharmacy students at the University of Tartu:

- 1. year 37
- 2. year 37
- 3. year 28
- 4. year 26
- 5. year 24

*including students on state- and non-state-commissioned student places, and students returned from their academic leave. Excluded are the students who are presently on academic leave.

Men constitute 21% of the submitted students. Relatively many (~50%) students are from Russian gymnasiums (they are all Estonian citizens).

There are 18 students in the Open University (second year).

APPENDIX XXVI. LIST OF STUDENTS (MASTER PROGRAMME) (available on CD and on-line)

Since 2002 there were 4 successful applications for pharmacy doctoral programme.

Name	Year of Admission	Field of pharmacy
K. Naelapää	2003	pharm. technology
K. Kogermann	2004	pharm. technology

I. Laidmäe	2004
N. Genina	2006

pharm. technology pharm. technology

Since 2002 three theses have been defended.

A. Kallas, 2002

Characterization of antibodies to coagulation factor VIII

K. Pudersell, 2006

Tropane alkaloid production and riboflavine excretion in the field and tissue cultures of henbane (Hyoscyamus niger L.)

K. Kogermann, 2008

Understanding solid-state transformations during dehydration: new insights using vibrational spectroscopy and multivariate modelling

Two theses (K. Naelapää and I. Laidmäe) will be defended in 2009. Defence of PhD thesis by the social pharmacy lecturer at the Department of Pharmacy D.Volmer is scheduled to 2009 as well.

5.5. GRADUATION

During 2001-2007, 220 stationary students have graduated from the Department of Pharmacy. The annual number of graduating students has varied from 20–39:

1990 – 30	1994 – 39	1998 – 15	2002 - 20
1991 – 36	1995 – 20	1999 – 11	2003 - 26
1992 – 28	1996 – 25	2000 – 23	2004 – 100 (35 + 65*)
1993 – 30	1997 – 18	2001 – 25	2005 – 39
			2006 – 39
			2007 – 36

* graduated from the Open University

During the same time, about 80 pharmacy students have interrupted their studies.

Thus, during 2001-2007, approximately 73% of submitted students have graduated. Approximately 60% of students accomplish the stationary studies with nominal time of study, i.e. 5 years.

According to the students' views, the reasons for interruption or prolongation of the studies are difficult curriculum (71%) followed by family reasons (12%) and financial reasons (6%).

33% of students need to work to finance their studies, 98% of them are having an opinion that working hinder their studies.

In opinion of the staff members of the Department of Pharmacy the study discipline of the pharmacy students is good (17%) or rather good (67%).

5.6. PHARMACEUTICAL SOCIETY OF THE UNIVERSITY OF TARTU (PSUT)

PSUT is a voluntary organisation uniting the pharmacy students and pharmacists working at the University of Tartu. PSUT was founded by the students of the Department of Pharmacy on Dec. 6th, 1990. In 2008, the membership of PSUT comprised 77 members and 4 member candidates.

The aims of PSUT include uniting pharmacy students and pharmacists at the University of Tartu into one academic body, developing pharmacy education and student research, also retaining and promoting knowledge and interest of the members towards their speciality.

Very well organised and popular are traditional seminars for pharmacists. PSUT*s field of activities is broad including arrangement of scientific meetings and lectures, excursions to pharmaceutical industries and companies in Estonia and abroad, also arranging entertainment for pharmacy students such as camping, sport and game tournaments etc. PSUT holds and values good contacts with EPSA (European Pharmaceutical Students Association) and pharmacy students organisations in neighbouring countries Latvia, Lithuania, Finland and Sweden.

The Faculty would emphasize the contribution of PSUT in organizing student scientific conference and seminars. The Department of Pharmacy has provided a room (office) for PSUT. The Faculty and the Department of Pharmacy sees PSUT as an equal partner whose role must increase, especially in guaranteeing the system of quality assurance in pharmacy training.

5.7. STUDENT COUNSELLING

There is a system of student-consultants or tutors for counselling students at the University of Tartu. The system is foremost meant for the first-year students with the aim to help the new students admitted to adapt to the life at the University of Tartu. At the beginning of the first semester, the city of Tartu, curriculum, studying, living conditions, traditions, student organisations, etc. are introduced. In the Faculty of Medicine the number of tutors has increased from two to six-seven. There are three tutors especially for pharmacy students. The services of tutors are in principle used by all first-year students as members of the student body have always the right to apply to tutors for advice. Informal counselling is considered the same or even more important than the tutor's system that takes place between students of different year through mutual communication and the Pharmaceutical Society of the University of Tartu.

5.8. FUTURE OCCUPATION

Today in Estonia, there are 509 community pharmacies, 29 hospital pharmacies, 55 wholesale companies and 27 manufacturing enterprises. The last ones include all enterprises and entrepreneurs who have received licence for production of medicinal products (including blood preparations) from the State Agency of Medicines. Pharmaceutical industry is represented by Tallinn Pharmaceutical Plant, branch establishment of Nycomed in South Estonia, Kevelt, Dorpson, Interchemie Werken "De Adelaar" Estonia (veterinary formulations), etc. Graduates form Tartu University find jobs also in the local representative offices of the foreign pharmaceutical companies, in the State Agency of Medicines, and in the different departments of the Faculty of Medicine at the University of Tartu. A few graduates continue their studies in the doctoral programme.

At the moment, there is a shortage of employees in the field of pharmacy in Estonia, mainly in community pharmacies. In average, there are 1-2 pharmacists, 1 pharmacy assistant and 1 staff member of the other profession working in a community pharmacy.

One third of the pharmacy students would like to work in community or hospital pharmacy, followed by agencies of foreign pharmaceutical companies (15%), pharmaceutical industry (14%) and governmental institutions (12%).

5.9. STUDENTS: STRONG SIDES

- The analysis of preferences of candidates, the decrease of removals during last years and the results of the survey conducted among students and teaching staff let to claim that in the last years pharmacy students (specially Open University students) are better motivated
- Strictness towards the quality of training process
- There is a "vital" organisation representing pharmacy students
- Improved English language proficiency
- Increasing interest of the undergraduate students to continue their studies in doctoral studies as reflected the competition rate about 2 : 1 (2008)

5.10. STUDENTS: WEAK SIDES

- State commission does not ensure the reproduction of pharmacists in Estonia
- The financial support for the pharmacy students is not sufficient. That is why they are obliged to work besides studying

- Poor Estonian language skills among originally non-Estonian students who have Estonian citizenship
- Insufficient knowledge of natural sciences of students admitted (weak spot of gymnasiums)
- During the studies pharmacy students have few contacts (similar subjects, research work etc.) with the other students of the Medical Faculty

5.11. STUDENTS: OVERCOMING THE SHORTCOMINGS

- To increase the admission to basic pharmacy training up to 40 students (state-commissioned study places) for longer period
- To develop the scholarship schemes and to increase the amount of study loans
- To raise motivation to continue in doctoral training in pharmacy

6. ACADEMIC AND SUPPORT STAFF

Personnel teaching subjects of the Pharmacy Master Programme can be divided (in similar to the subjects) into three groups:

- staff of the Department of Pharmacy, covering 68.5% of the programme
- staff of the other departments of the Faculty of Medicine, covering 27 % of the programme
- staff of different departments of other faculties, covering 4.5 % of the programme

6.1. ACADEMIC STAFF OF THE DEPARTMENT OF PHARMACY

For teaching staff, there are 8.75 positions in the Department of Pharmacy, including 1 professor, 2 senior lecturers, 3 lecturers and 2.75 assistants. Senior research fellow and 3 specialists are involved in teaching. One of the specialists is on maternity leave at the present time.

Summa summarum: at present 14 persons cover 68.5 % of the Pharmacy Master Programme.

Distribution by gender of the academic staff is 7 male and 7 female persons, distribution by age is 1 between 25-30 years, 4 between 30-39, 2 between 40-49, 3 between 50-59, and 4 over 60 years. Distribution by the academic degree is 2 doctors of pharmacy, 1 doctor of medical sciences, 5 candidates of science (Ph. D.) (2 in pharmacy and 3 in biology), 3 masters of science (2 in pharmacy and 1 in organic chemistry).

Staff of the Department of Pharmacy involving in the teaching process:

Peep Veski, PhD, Dr. Pharm, professor of pharmaceutical technology and biopharmaceutics Karin Kogermann, Dr. Pharm, specialist (on maternity leave) Vallo Matto, Dr. Med Sci., senior research fellow Ain Raal, PhD (pharmacy), senior lecturer of pharmacognosy Toivo Hinrikus, PhD (biology), senior lecturer of pharmaceutical chemistry Andres Meos, PhD (biology), lecturer of pharmaceutical chemistry Urve Paaver, MSc (organic chemistry), lecturer of pharmacognosy Daisy Volmer, MSc (pharmacy), lecturer of social pharmacy Piret Kreutzwald, MSc (pharmacy), assistant of pharmaceutical technology Tea-Mai Tammaru, assistant of pharmaceutical management Maaja Paavo, assistant 0.75 of pharmaceutical technology Ivo laidmäe, PhD student, since July 2008 specialist 0.5 Elmar Arak, PhD (pharmacy), specialist Ulve Pihlik, PhD (biology), specialist 0.5

APPENDIX XXVII. CV-s ACADEMIC STAFF OF THE DEPARTMENT OF PHARMACY (CV with list of publications available on CD and on-line)

The staff teaches following obligatory subjects ((2008/2009):

Introduction to Pharmacy and History of Pharmacy

* - responsible teacher

- Introduction to Pharmacy and History of Ph A. Raal*, P. Veski, D. Volmer
- Pharmaceutical Terminology
- T. Hinrikus*, P. Veski, A. Raal
- Analytical Chemistry
 - A. Meos*, E. Arak, I. Laidmäe
- Bioethics
 M. Paavo*
- Pharmaceutical Chemistry
 T. Hinrikus*, A. Meos, E. Arak, T.-M. Tammaru
- Pharmacognosy
 A. Raal*, U. Paaver, D. Volmer, U. Pihlik
- Pharmaceutical Technology
 P. Veski*, U. Paaver, P. Kreutzwald, M. Paavo
- Physicochemical Analysis of Drugs (Physical Pharmacy)
- P. Veski*, K. Kogermann, T. Hinrikus, U. Paaver, A. Meos
- Pharmaceutical Excipients
 P. Veski*
- Pharmaceutical Management
- T.-M. Tammaru*Social Pharmacy
 - D. Volmer*, P. Villako, adjunct instructor
- Biopharmaceutics
 P. Veski*, V. Matto, P. Kreutzwald
- Galenical Pharmacy
- P. Veski*, P. Kreutzwald
- Pharmacoeconomics and Pharmacoepidemiology
 D. Volmer*, adjunct instructors A. Irs, P. Veerus, L. Rootslane, H. Pisarev, J. Lass
- Pharmaceutical Commodities A. Meos*
- Drug Metabolism (in 2010/2011) A. Meos*
- Design of Research Work T. Hinrikus*
- Seminars of Research Work
 P. Veski*, A. Meos, T. Hinrikus, A. Raal, D. Volmer, T-.M. Tammaru, E. Arak, V. Matto, P. Kreutzwald, U. Paaver, M. Paavo

Academic staff teaches also the elective subjets.

Additionally, the teaching staff of the Department of Pharmacy is responsible for supervising the research works. The Department of Pharmacy organizes and is responsible for the in-service training.

6.2. APPOINTMENT SYSTEM FOR ACADEMIC STAFF

The duties and rights of academic staff, also requirements for different positions are described inJob Descriptions of University of Tartu Academic Staff (adopted by the Council of the University of Tartu on June 25th, 1999 and amended on June 1st, 2001, April 1st 2005, February 23rd, 2006 and April 27th, 2007).

The procedure for elections is described in University of Tartu Election Rules (adopted on November 24th, 1995 and amended 14 times).

APPENDIX XXVIII. JOB DESCRIPTION OF UNIVERSITY OF TARTU ACADEMIC STAFF (available on CD and on-line)

APPENDIX XXIX UNIVERSITY OF TARTU ELECTION RULES (available on CD and on-line)

Contest is public, announced in the biggest daily Estonian newspaper ("Postimees") and on the website of the University of Tartu. Assistants, research fellows, lecturers, senior research fellows and senior lecturers are elected by the Faculty Council and professors by the University Council by secret voting. The assistant, research fellow and lecturers positions candidates are presented by the chief of the department to the Faculty Council, for selection of senior lecturers, senior research fellows and professors a commission is organized, which evaluates candidates' suitability for the position applied. The professor's commission includes one/two experts from abroad. Professors, senior research fellows and research fellows and senior lecturers positions are appointed for 5-years, lecturers for 4 years and research fellows and assistants for 3 years.

It should be admitted that actual competition for the positions is not really intense; usually only one person applies for the position. Due to the language requirements (good skills in Estonian) the candidates are limited to the Estonian pharmacists or researches. Unfortunately, there is a shortage of suitable candidates in the Republic of Estonia. And there is existing persistent conception as if the person who has held this position before has the best chances to be appointed to hold this position further. Of course, such situation doesn't favour academic movement. As a result, people often work during their entire career at the same position and that's why the are not many possibilities for further rise in the hierarchy.

Thus, the renewal of the staff at the Department of Pharmacy is not very active. In any case, in order to diminish isolation, guest lecturers who would share with us pedagogic, scientific and practical experiences of other universities, should be invited to the Department as often as possible. For the same reason, our students and academic staff should be given possibilities to visit according institutions of other universities.

The Faculty misses centralized complementary teaching system for academic staff, that is why the basis of foreign contacts are mainly personal initiative of our staff and from it grows scientific collaboration. From the analysis of the questionnaires of the teaching personnel it appears that some teachers do not consider it important to modernize the complementary teaching, though majority of colleagues believe that creation of a certain complementary teaching system should be necessary. Apparently, this problem requires a broader discussion at the Faculty of Medicine and the implementation of the results of this discussion.

6.3. RESEARCH

In 2001-2008 the activity of the Department of Pharmacy has been focused mainly on teaching, in 2008 there is only one full time researcher out of 14 academic employees. Though the overall research activity is still low, the number of ISI Web of Science indexed citations has more than doubled in 2005-2008 as compared with 2001-2004. In 2008 (stand: May, 19), 11 ISI Web of Science indexed articles or abstracts are accepted/in press.

Scientific activities of the staff are reflected in their publications and participation in scientific forums (Appendix XXVII).

Research tracks

In 2008, in the Department of Pharmacy there are three major ongoing research tracks and one applied research project

- Pharmaceutical technology
- Pharmaceutical analysis
- Social pharmacy

The pharmaceutical technology track (PI Professor P. Veski) covers following topics

- Solid state properties of pharmaceutical substances and their modification possibilities
- Evaluation of bandages/patches containing salmon fibrinogen and trombin by electrospinning technique
- Development and pharmacokinetic evaluation of prolonged-release capsule formulations for local drug treatment in colon and improvement of the dissolution test methods

The pharmaceutical technology track employs three Ph.D. students and four academic staff members, the research is conducted on a collaborative basis with the Divisions of Pharmaceutical Technology and Biopharmaceutics and Pharmacokinetics, University of Helsinki and the School of Pharmacy University of Otago, Dunedin, New Zealand, and the Pharmaceutical Solid State Research Cluster (PSSRC) as well as with the Department of Immunology, University of Tartu. Due to the lack of

equipment most experiments are performed in the collaborating institutions, which is one hand a shortage but also an excellent opportunity for our younger colleagues to develop skills to work in the international research environment. The pharmaceutical technology track is also essential for the sustainable development of the Department of Pharmacy, for 2009 a big multi-dimensional domestic grant application is in preparation.

The pharmaceutical analysis track consists of two independent projects

- Herbal drugs and evaluation of new pharmaceutical formulations and chemical composition of different essential oil drugs (PI Senior Lecturer Ain Raal)
- Comparative evaluation of the biopharmaceutical parameters of the formulations available on the Estonian and Russian Federation drug markets (PI Lecturer Andres Meos)

The "herbal" project is partly applied and it concentrates on phytochemical analyses of resveratrol and its derivatives, comparative phytochemical analysis of the different species of willowherb as well as on comparison of chemical composition of volatile oil herbs widely used in Estonia. The collaborators are from with the Institute of Chemistry, Tallinn University of Technology, the Department of Pharmacology, Faculty of Medicine, University of Tartu and the Department of Food Hygiene and Control, Estonian University of Life Sciences, and this project will employ in 2008 at least one but preferably two Ph.D. students.

The "pharmacopoeial" project is an example of full "in-home" project. All steps from experimental analysis till manuscript preparation are done in the Department of Pharmacy.

The social pharmacy track (PI Daisy Volmer) covers:

- Theoretical social pharmacy studies
- The impact of pharmacy policy changes to community pharmacy practice
- The quality of services provided to over-the-counter customers in Estonian community pharmacies
- Assurance of drug safety at community pharmacy
- Communication between health care professionals in Estonia
- The role of community pharmacists in the treatment of patients with chronic conditions

This track is fully international and it is cooperative with institutions from adjacent as well as far countries (incl. Australia). Secondly, the social pharmacy track is very popular among students and for many students it serves as an entry level research work in pharmaceutical sciences.

Applied research project: Methods for determination of the ingredients and impurities of the ingredients in semi-solid dosage forms

Aim of this project is to determine the salicylic acid and its impurities, bronopol, sodium diclofenac and its impurities, terbinaphine hydrochloride, ketoconazol, heparine, escine *etc.* in semisolid formulations of the Tallinn Pharmaceutical Plant.

6.4. SUPPORT STAFF OF THE DEPARTMENT OF PHARMACY

In addition to the teaching staff, there are 9 persons working at the Department of Pharmacy. Preparations for teaching (mostly laboratory works) are made by three senior laboratory assistants, all of them are pharmacists graduated from the University of Tartu. There are also 5 persons in the position of specialist. One specialist – graduated pharmacist – works in the Library of Department. Three of them are involved in teaching: emeritus senior lecturer (PhD E. Arak) teaches pharmaceutical chemistry and analytical chemistry, PhD U. Pihlik (biologist) teaches pharmacognosy, PhD student I. Laidmäe teaches analytical chemistry. PhD K. Kogermann is on maternity leave. Two employees are without pharmacy education, technician (preparator by the position) and secretary of the Department dealing with administrative work.

6.5. ANALYSIS OF PERSONNEL

In undergraduate level, the number of teaching staff at the Department of Pharmacy is sufficient according to the courseload normative at the University of Tartu. In reality, 14 persons of the Department have to cover courseload normative for 17 different subjects. Therefore, it is inevitable that some persons participate in teaching of two, three or even more different subjects. Considering general competency of the personnel, teaching several related subjects can be beneficial for themselves. Especially for younger staff (assistants) this practise is rather well justified. From the other

hand, as clearly seen from the self-report survey of the personnel, this situation disperses energy and concentration of the staff. The survey also showed that eventhough *per se* teaching and research at the Department is sufficiently staffed, the total workload of the personnel (teaching, research, and supervision of students) is excessive. Therefore, we have to admit that altogether there is insufficiency in personnel at the Department to carry out its functions in high level, considering its duty to prepare specialists in pharmacy and taking responsibility for their qualification.

Situation, where a speciality subject is taught by one or two persons, makes it difficult to send even one of them to advanced training courses for longer periods or to give them teaching-free terms e.g. to be able to put together new teaching material. The same problems come up in case of serious illness of someone from the personnel.

According to the statue of the University, the lectures should, in principle, be held by professor(s), senior lecturers or lecturers. In context of the proportions of different positions there is insufficiency in senior lecturers and lecturers, also in professors. Promotion of personnel to higher positions is "hindered" by the requirements for both election and reelection. Above mentioned facts explain why some of the lecturing (e.g. pharmaceutical management, pharmaceutical technology, professional ethics) is carried out by assistants.

From the self-report survey of the personnel can be seen that approximately 70% of teaching staff acknowledges insufficient self-advancing possibilities. There is need for long term advanced courses in abroad and also for pedagogical training or short term speciality courses.

6.6. PERSONNEL OF THE DEPARTMENT OF PHARMACY: STRONG SIDES

- Stabile and experienced teaching staff
- Sense of duty, respect and esteem towards their speciality
- "Positive" conservatism honouring and following academic and speciality traditions
- Understanding of the leading role of the Department of Pharmacy in the establishing and forming status of pharmacy in Estonia. Participation in the work of different boards, committees, and working groups
- Good availability and open attitude towards the students
- Increasing activity in research
- Highly qualified laboratory assistants

6.7. PERSONNEL OF THE DEPARTMENT OF PHARMACY: WEAK SIDES

- Distribution of the academic staff by age half of the staff is 50 years old or older, one third reached retirement age
- Insufficient contacts with practical pharmacy especially with (university) community pharmacies and hospital pharmacies
- Insufficient number of research staff and research activity
- Insufficient communication and co-operation between individuals at the Department
- Shortage of continuing education in pharmacy and pedagogics

6.8. SUSTAINABLE DEVELOPMENT OF PERSONNEL IN THE DEPARTMENT OF PHARMACY: ACTION PLAN

- To incorporate more doctoral students, researchers and specialists from outside of the Department of Pharmacy at the teaching process.
- Create permanent positions of pharmacist-teachers in university pharmacies. The primary task of these persons will be supervising students during their training period and prepare them for independent work in future. Also lecturing courses in pharmaceutical management (including compulsory and optional subjects) at the University
- To enhance the research activity by decreasing teaching overload
- Find (financial) means to open new positions in order to diminish above-mentioned dispersing of teaching personnel and increase capacity of research groups working in different fields of pharmacy

- To create more possibilities for the teaching staff to visit different pharmacy schools and research institutions abroad
- To organise scheduled seminars where staff members can present and share new knowledge and information in the field of their specialities with colleagues. Also pharmacists who supervise students training in pharmacies should participate in these seminars
- Find more possibilities for teaching staff to join pedagogical and/or speciality self-advancing courses

6.9. ESTONIAN ACADEMICAL SOCIETY OF PHARMACY (EASP)

The first professional pharmacy organisation - Estländische Pharmazeutische Gesellschaft – on the Estonian territory was established in 1871. The organisation uniting pharmacy workers of Estonian origin (including pharmacists) was founded in 1917.

In 1924, the Academic Society of Pharmacy was established. The main aims of the Society were developing the pharmacy research and studies, also finding opportunities for international cooperation. The Society had active correspondence with several professional organisations all around Europe. There were also visits, conferences and exchange of literature. The Society published its own journal. The Society had close connections with kindred people and the Estonian-Finnish-Hungarian Pharmaceutical Society (E.S.U.) was founded in 1932. The Society involved the whole sector of pharmacy and was very active until 1940. In 1936, the three countries had a common pharmacy congress together. In the same year, also a foundation to support pharmacy students was established by the E.S.U.

Today there are several professional organisation and societies but there is no so-called umbrella organisation in Estonia. On the state level, the State Agency of Medicines handles the problems of pharmacy. None of these organisations is mainly interested in developing pharmacy studies and research. That is the most important reason why Estonian Academic Society of Pharmacy (EASP) was reestablished on February 17th in 2006 (<u>http://www.med.ut.ee/farmaatsia</u>/). The Society gives also the pharmacists who are active in academic sphere opportunity to participate in the development of pharmacy in Estonia.

Employees of the Department of Pharmacy, University of Tartu, being gathered as one professional organisation, have had prolific work. The Society participated in the organisation of EAFP (European Association of Faculties of Pharmacy) conference in Tartu in 2006. The Society also participated in the organisation of The Second BBBB (Balaton-Baltic-Bled-Bosporus) Conference in Tartu (September 2007) and 6th World Meeting on Pharmaceutics, Biopharmaceutics and Pharmaceutical Technology (was held in Barcelona in 2008). The Society will also participate in the PHARMINE program.

To compensate the shortcomings caused by the financing scheme for higher education, it is necessary to involve all fields needing trained specialists into funding the education. There is the possibility to use the financial support of pharmacy sector (and also private sector) for developing pharmacy studies through a fund for specific purposes. The foundation was established under the Estonian Academic Society of Pharmacy. Grants will be used according to the wishes of the sponsor and will be fixed with an additional agreement. The foundation was established in July 2007 when the agreement between the Tallinn Pharmaceutical Plant and the EASP was signed. The Tallinn Pharmaceutical Plant will support the purchase of professional literature. Several companies already have shown interest in joining the foundation.

The board of EASP consists of theree members:

Chairman – professor P. Veski Vice Chairman – lecturer D. Volmer Secretary – lecturer U. Paaver

7. LEARNING ENVIRONMENTS

7.1. ROOMS

I. Department of Pharmacy

Historical background.

Up to Sepember 2005 the Department of Pharmacy located in a building (Jakobi street 2) that was specially built for the Department in 1939. In early fifties, the second wing was built for the Department of Chemistry. Nowadays, the whole building is called as the Chemistry Building.

- The building was old and obsolete,
- Ventilation was very poor or missed totally,
- Waterworks and sewerage needed renewing,
- Some special facilities, such as rooms for aseptic work, autoclaving etc. needed

Additional problems were highlighted specially by the personnel:

- Several offices were full of laboratory equipment not in everyday use,
- Senior lab assistants worked in very difficult conditions

Present situation

In September 2005 the Department of Pharmacy started the academic year in the new building. University of Tartu renovated a very old building for the Institute of Technology University of Tartu. Two new floors (6th and 7th floor) were built for the Department of Pharmacy. In the same building there is also the State Agency of Medicines. New Department of Pharmacy is situated in the Maarjamõisa Campus – very close to the Biomedicum (building for preclinical departments of the Faculty of Medicine) and the University Clinics. This year the University of Tartu started to build a new Chemistry Building, which is the next to the building of the Department of Pharmacy.

On the 7th floor there are:

- lecture room for 56 students
- library
- computer class
- meeting room (room for seminars)
- office of the Department and the Head of the Department
- working rooms (office) for two senior lecturers
- working room (office) for PhD students

On the 7th floor there are rooms for communications of the building (heating, ventilation etc.)

On the 6th floor there are:

- 2 teaching laboratories (16 working places in each) for chemistry, pharmacognosy
- teaching laboratory (16 working places) for pharmaceutical technology
- store for current materials (ingredients, reactives, laboratory glass etc.)
- laboratories for senior laboratory assistants for preparing the laboratory works
- classroom for social pharmacy (small teaching pharmacy), room for seminars
- store for herbal drugs
- room for titration
- room for spectrometry
- HPLC room
- offices
- kitchen
- GC room
- research laboratory

In the basement there are 4 storing rooms. The student organization has a separate room.

II Other departments of the Faculty of Medicine. Teaching of all medicinal subjects for pharmacy students is carried out in the Biomedicum where all the preclinical departments of the Faculty of Medicine are located. There are 9 departments on in total 9510 m² that are equipped with modern lecture halls, laboratories and equipment.

<u>III Departments outside the Faculty of Medicine.</u> During the recent years, the University of Tartu has renovated several teaching buildings but also built new ones. The Faculty of Mathematics and Informatics moved to the new modern building some years ago. The new and very well equipped Chemistry Building will open for the next academic year.

Summa summarum: The learning and working facilities for pharmacy students are very good.

APPENDIX XXX. MAP OF TEACHING PREMISES (available on CD and on-line)

7.2. LIBRARIES

Tartu University Library (<u>www.utlib.ee</u>)

Tartu University Library is the oldest and biggest continuously working library in Estonia. Being the most universal Estonian research library, its collections contain materials on all fields of science taught at the university.

Fulfilling some functions of national library together with the Estonian National Library, the Estonian Academic Library and the Archival Library of the Estonian Literary Museum, Tartu University Library collects and holds printed and other documents published in Estonia, creating as complete collections of these materials as possible. Current Estonian National Bibliography was compiled at Tartu University Library in the 1920s and 1930s.

In 1958 the library was given the status of the 'scientific library' (according to the Soviet classification of libraries), resulting in better conditions for bibliographic work and research, and in the creation of restoration department at the library. The library started to <u>publish</u> regularly (collections of articles, bibliographies, catalogues of the collections, exhibition catalogues, since 1995 – yearbooks, etc.); and to organise scientific conferences (17 up to the present day) and seminars.

Tartu University Library is a member of the Consortium of Estonian Libraries Network (ELNET); the members of the Consortium use integrated information system INNOPAC and develop the unified <u>e-catalogue ESTER</u>. The library started using its own electronic catalogue INGRID in the end of 1994.

The size of the collections - 3 813 941 items 12% of publications are in Estonian, 35% – in Russian, 30% – in German, 10% – in English, 13% – in other languages.

The Library belongs to the following international organisations:

- Association of European Research Libraries (LIBER),
- Association of Libraries of the Baltic Area Bibliotheca Baltica,
- European Association of Health Information Libraries (EAHIL),
- International Association of Music Libraries (IAML),
- European Information Association (EIA) and its branch for Baltic and Nordic Countries.

Library of the Biomedicum

The library located in the Biomedicum is a branch of the Tartu University Library. In the Biomedicum teaching of several preclinical subjects for pharmacy students take place. Pharmacy students use the library.

Library and computer class of the Department of Pharmacy

The library lends books for in-house use to all readers of the Tartu University Library. During study sessions, the personnel and students of the Institute of Pharmacy are preferred.

The computer class holds 21 working places and 17 computers. Computers (wireless + Internet) can be used free of charge and printers and scanners for pay.

The library of the Institute of Pharmacy was established in 2006. The collection consists of study and research literature from different pharmaceutical fields. The collection is being renewed constantly. Most of the collection includes publications deposited in the Tartu University Library.

Recent publications are listed in the electronic catalogue ESTER, information about the full collection is available at the library. Library of the Department of Pharmacy is also a branch of the Tartu University Library.

APPENDIX XXXI. LIST OF STUDY MATERIALS/TEXTBOOKS AND MONOGRAPH IN THE LIBRARY OF THE DEPARTMENT OF PHARMACY

7.3. LEARNING ENVIRONMENTS: STRONG SIDES

- Modern labs and learning environment
- the Department has a computer class exclusively for pharmacy students,
- the Department has a library for pharmacy students with quiet study places,
- for medicinal subjects, there are also contemporary conditions for teaching and scientific work in the Biomedicum
- the Department is covered with WiFi

7.4. LEARNING ENVIRONMENTS: WEAK SIDES

- old and obsolete teaching laboratory equipment,
- shortage of laboratory supplies
- the text books in Estonian are not available in all pharmacy specialities

7.5. LEARNING ENVIRONMENTS: ACTION PLAN

In general the learning environment of the pharmacy studies is good. The weak spots have been acknowledged and according to the possibilities of the Department and Faculty efforts have been made during the recent year to improve the situation.

8. COLLABORATION

There is no other institution like the Department of Pharmacy in Estonia and the relations with professional institutions and organisations in Estonia and abroad are very important for the Departments' development and pharmacy development in the whole country. The fixed priority of the Department of Pharmacy is extension of foreign affairs in all respects.

8.1. COLLABORATION IN ESTONIA

The Department of Pharmacy has an important role in promoting and developing pharmacy in Estonia. Opinions of professional organisations and collaborators give valuable feedback for further pharmacy curriculum development. The constructive criticism of the professional organisations has led to medicine biased changes in new pharmacy curriculum, also several changes in syllabi of various subjects have been done along the feedback suggestions. The Department works in close collaboration with following institutions and organisations:

Governmental institutions

- 1. Ministry of Social Affairs
- 2. State Agency of Medicines

Professional organizations

- 1. Estonian Society of Pharmacists,
- 2. Estonian Society of Hospital Pharmacists,
- 3. Estonian Society of Wholesale Enterprises,
- 4. Estonian Pharmacists' Association,
- 5. Chamber of Estonian Pharmacists,

- 6. Estonian Society of Assistants of Pharmacists,
- 7. Estonian Society of Manufacturing Enterprises
- 8. Pharmaceutical Society of University of Tartu (PSUT)

APPENDIX XXXIV. OPINIONS OF PROFESSIONAL ORGANIZATIONS (available on CD and on-line)

Research and teaching institutions

- 1. Department of Immunology University of Tartu
- 2. Department of Pharmacology, University of Tartu
- 3. Department of Food Hygiene and Control, Estonian University of Life Sciences,
- 4. Institute of Technology, University of Tartu
- 5. Institute of Chemistry, Tallinn University of Technology

Personnel of the Department participates in work of several speciality commissions:

- 1. Commission of Marketing Authorisation of Medicinal Products -senior lecturer T. Hinrikus,
- 2. Commission of Terminology senior lecturer T. Hinrikus, professor P.Veski, senior lecturer A.Raal, lecturer D. Volmer.

Department of Pharmacy collaborates with Tallinn Pharmaceutical Plant and Interchemie Eesti AS.

8.2. FOREIGN AFFAIRS

The Department of Pharmacy is a member of the European Association of the Faculties of Pharmacy (EAFP) and the Head of the Department professor P. Veski is a member of the Executive Committee since 2001. The Department of Pharmacy in collaboration with Estonian Academic Society of Pharmacy organized Annual Meeting of EAFP "Quality Assurance in Pharmacy Education" in 2006. The Department of Pharmacy together with the Estonian Academic Society of Pharmacy participates as the only faculty/department from Eastern Europe in the programme "PHARMINE".

From contracts related to pharmacy studies, Erasmus Bilateral Agreement has to be mentioned. The Department of Pharmacy has a mentioned agreement with the Faculty of Pharmacy at the University of Helsinki and the Faculty of Pharmacy at the University of Complutense, Madrid also with the University of Professional Education, Utrecht.

Professor P. Veski is a member of the Group of Experts 12 (Galenical Products) of European Pharmacopoeia.

Senior lecturer A. Raal is working in the group of experts editing the monograph of medicinal herbs (WHO)

Professor P. Veski, Lecturer D. Volmer – EMEA experts

Senior lecturer A. Raal - an alternative member of EMEA Committee on Herbal Medicinal Product

Several people from the academic staff of the Department are members of international pharmacy associations:

PhD student K. Naelapää and PhD K. Kogermann – American Association of Pharmaceutical Scientists (AAPS),

Professor P. Veski – EUFEPS

Lecturer D.Volmer – European Society of Clinical Pharmacy (ESCP)

The Department runs a research project "Development of site-specific or time-controlled release dosage forms for man" in collaboration with the Division of Biopharmaceutics and Pharmacokinetics, the Faculty of Pharmacy of the University of Helsinki. Collaboration in this topic started in 1995. In Tartu, the project is leaded by prof. P. Veski.

In the field of social pharmacy D. Volmer has a very productive collaboration with several institutions and persons: prof. M Airaksinen and Dr. S. Bell from the Division of Social Pharmacy, Faculty of

Pharmacy, University of Helsinki, Dr. J. Lilja from Abo Akademi, Dr. S. Haavik from Institute for Pharmacy Practice Research, Norway, Dr. A. Ekedahl, Faculty of Pharmacy, University of Lund, Sweden etc.

In the field of pharmaceutical technology the Department of Pharmacy collaborate, today mainly via PhD students of the University of Tartu working in research groups, with the Division of Pharmaceutical Technology, Faculty of Pharmacy, University of Helsinki and the Department of Pharmaceutics and Analytical Chemistry, the Danish University of Pharmaceutical Sciences.

APPENDIX XXXII. VISITING LECTURERS AT THE DEPARTMENT OF PHARMACY (2001-2008) (available on CD and on-line)

APPENDIX XXXIII. CONTINUING EDUCATION OF ACADEMIC STAFF OF THE DEPARTMENT OF PHARMACY (2001-2008) (available on CD and on-line)

9. QUALITY ASSURANCE IN PHARMACY TRAINING

- Students level. Students studying on a learning year basis are divided into smaller groups for seminars and practicals. This allows the students to create a common opinion, strengthens the students self-discipline and self-control.
- Course level. The teacher explains the students the principles he/she sets for teaching content, process, feedback, feedback analysis, and how teaching quality is assured. This level allows flexibility and quick changes when whatsoever problems occur.
- Department of Pharmacy level. The Department of Pharmacy (the Head of the Department) is responsible for the tactic decisions of the quality assurance of teaching such as course and syllabi development, control of teachers, teaching resources and processes etc.
- Faculty of Medicine level. The faculty level quality assurance is organized by the Dean's Office and Study Commission which are responsible for curriculum development on conceptual level such as harmonization of courses, setting objectives and outcomes of courses, and analyzing feedback. The Dean's Office and Study Commission are working in close cooperation of the Department of Pharmacy and University of Tartu Office of Academic Affairs.
- University of Tartu level assures the pharmacy teaching quality on the strategic level (via instruments of the University Commissions, Rectors Office, and Office of Academic Affairs). The on-line Study Information System (SIS) is administered on the university level. The Office of Academic Affairs collects, analysis, and reports the feedback information delivered by the students via SIS.
- Governmental level. The pharmacy teaching quality is periodically reviewed by the Estonian Higher Education Accreditation Centre (EHEAS), an independent subsidiary of the Estonian Ministry of Education and Science. The EHEAS employs external international experts for compiling accreditation reports, accredits the pharmacy curricula, and ensures the compatibility of the pharmacy curricula within the European educational space.
- Public level. The pharmaceutical community and the society feedback assure the pharmacy curricula adequacy for the public and professional needs of Estonia, its added value to the society, and sustainability for the Estonian healthcare system.
- Programme Council of the Pharmacy Master Curriculum harmonizes integration process of four levels: Department of Pharmacy, Faculty of Medicine, University of Tartu as well as feedback from professional bodies.

10. SPECIFIC COMMENTS TO THE GENERAL RECOMMENDATIONS OF THE JOINT FINAL REPORT OF THE ACCREDITATION EXPERT TEAM, 2001

Specific comments to the General Recommendations of the Joint Final Report of the Accreditation Expert Team, 2001

1. The Accreditation Expert Team recommended to establish Programme Committees for Pharmacy Master and Doctoral programmes.

ACTION TAKEN: The Pharmacy Master Programme Programme Committee was established following the principles listed below:

The responsible teachers of the major tracks taught at the Department of Pharmacy (technology, chemistry, pharmacognosy, social sciences) are involved.

The responsible teachers of the major subjects taught at the Faculty of Medicine's departments are involved.

The representatives of employers are involved, too.

The representative of student organization is also involved.

The members of the Programme Committee for Pharmacy Master Studies are: Head of the Committee: Prof. P. Veski, Head of the Department of Pharmacy Members: Sen, lecturer (chemistry) T. Hinrikus, Department of Pharmacy

Sen. lecturer (chemistry) T. Hinrikus, Department of Pharmacy
Sen. lecturer (pharmacognosy) A. Raal, Department of Pharmacy
Lecturer (social pharmacy) D. Volmer, Department of Pharmacy
Sen. lecturer (organic chemistry) U. Soomets, Department of Biochemistry
Prof. (pharmacology) A. Zarkovski, Department of Pharmacology
Assistant (clinical pharmacology and pharmacotherapy) A. Irs, Department of
Pharmacology, Vice-Director of the State Agency of Medicines
K. Sarv, responsible pharmacist, Estonian Pharmacists' Association
I. Uiboleht, Director of the Hospital Pharmacy of the Tartu University Clinics,
Estonian Society of Hospital Pharmacists
R. Unt, Director-General, Tallinn Pharmaceutical Plant
Representative of student organization

The competence of the programme committee is high and it has intensively worked on the creation and implementation of the syllabi for the newly established clinical pharmacy track's subjects. Presently, the committee focuses its activity on the subjects' syllabi integration and updating, as well as its harmonization with the demands of the contemporary pharmaceutical education.

The Doctoral Programme Committee has established for the Faculty of Medicine and due to the relatively small number of Ph.D. students in pharmacy the faculty's policy does not foresee an independent Pharmacy Doctoral Programme Committee. The Head of the Department of Pharmacy is member of the Doctoral Programme Committee of Faculty of Medicine and thus represents the interests of the Ph.D. students of pharmacy

2. The Accreditation Expert Team recommended to involve the teaching staff in Department of Pharmacy into the Programme Committees.

ACTION TAKEN: The recommendation has been followed (see, previous recommendation). Further involvement of teaching staff is considered.

3. The Accreditation Expert Team recommended to implement the European Credit Transfer System

ACTION TAKEN: The implementation of the ECTS system is accepted by the University of Tartu and during the transitional period both domestic and ECTS systems are in use. The University of Tartu recognizes the credits awarded by the foreign universities.

4. The Accreditation Expert Team recommended to establish a Research Committee in the Department of Pharmacy to develop a strategic approach to research.

ACTION TAKEN: No action is taken since it is not applicable due to the university regulations which foresee establishment of such committees on the faculty level. However, the Department of Pharmacy teaching staff is involved in several research planning and expert committees on the faculty and
university levels and thus are able either directly or indirectly promote, foster, and endorse the strategic decisions concerning the research strategy at the Department of Pharmacy.

5-6. The Accreditation Expert Team recommended to provide more emphasis on the personal development needs of academic staff (in particular, to replace the staff reaching retirement age). The Accreditation Expert Team recommended also to recruit more staff from outside the department.

ACTION TAKEN: During the last seven years two new academic persons are recruited. The Department of Pharmacy fully acknowledges the further need of the sustainable development of the department academic personnel, however, as far as the non-competitive salaries are the major limiting factor to recruit young colleagues, there is no acceptable solution for this problem. Nevertheless, the number of Ph.D. students in pharmacy has increased during the last years and within the next years two or three Ph.D. students/graduates have expressed their wish to continue their professional track as the Department of Pharmacy teachers (Mrs. Karin Kogermann and Mr. Ivo Laidmäe have agreed, Mrs. Kaisa Naelapää still considers the academic track). The recommendation for the "outside" recruitment is also filled, though the same monetary limitations apply. A pharmaco-economist, a clinical pharmacologist, a clinical pharmacist, and a representative of a pharmaceutical marketing company teach part-time at the Department of Pharmacy.

7. The Accreditation Expert Team recommended to balance the chemistry bias to a more equal balance with medical and clinical subjects.

ACTION TAKEN: The recommendation is put into effect, the proportion of "chemistry subjects" is reduced by a half and respectively the proportion of "clinical subjects" is increased.

8. The Accreditation Expert Team recommended that the process of admitting students should be improved.

ACTION TAKEN: On the university and faculty levels, there have been organized open door days to inform the secondary (high) school students on the study opportunities at the Department of Pharmacy. In 2008, virtually 100 % of future pharmacy students have on-line access to Internet resources, and the university has created home-pages for future students with sufficient information. No further information campaign is needed.

9. The Accreditation Expert Team recommended to provide tuition in English language to improve the students' linguistic skills.

ACTION TAKEN: This recommendation is in partial contradiction with the Faculty of Medicine policy which foresees either a sufficient English proficiency already before the admission or alternatively, the language learning on individual basis and initiative. Pharmacy students have also an option to choose the English language as an elective subject (for up to 18 ECTS during five years). Teaching of English language *per se* does not fall into the scope of activities of the department, however, the teachers encourage and motivate whenever possible the students to study from English language textbooks and study materials. Overall, the English proficiency in 2008 among the pharmacy students has to be considered sufficient.

10. The Accreditation Expert Team recommended to increase the group work and problem-based learning proportion.

ACTION TAKEN: The group work and problem-based learning proportion has been increased in following subjects: social pharmacy, pharmacoeconomy and pharmacoepidemiology, pharmacology, pharmacotherapy, primary care medicine. Partially it is implemented also for physicochemical analysis of drugs (physical pharmacy), laboratory medicine, pharmaceutical excipients, professional ethics, biopharmaceutics seminars.

11. The Accreditation Expert Team recommended to encourage the pharmacy students to continue in the Ph.D. programme.

ACTION TAKEN: The number of Ph.D. students during the last years has increased. The competition for the Ph.D. study positions increases with every year. The limiting factor is that the pharmacy doctoral studies are not financed directly (i.e. there are no state commissioned study places in pharmacy) but the financing depends on the general competition on the faculty level. Also, all fields of pharmacy have

not been covered with equal number of Ph.D. students while the priority so far has been given to the pharmaceutical technology. In 2008, two Ph.D. students start their studies in pharmaceutical chemistry (with Department of Technology). The persisting problem is still the fact that a part of the academic staff of the Department of Pharmacy does not qualify as Ph.D. supervisors due to the formal reasons though their *de facto* teaching experience and research capacity would be sufficient to supervise the Ph.D. work. On the university level, a "loosening" of certain formal criteria for supervisors would be appropriate.

12. The Accreditation Expert Team recommended modernization of some subject areas such as pharmacognosy and pharmaceutical chemistry.

ACTION TAKEN: The recommendations are followed. In pharmaceutical chemistry, the proportion of lectures has been reduced, the content of the course(s) has been updated along the experience of neighbouring countries and it corresponds now to the structure of the major textbooks in this field. The chemistry of both classic and novel compounds is taught. An integrative approach is applied, i.e. the content of the pharmaceutical chemistry is associated on one hand with the analytics, on the other hand with the clinical subjects.

The farmacognosy syllabus is modernized along the new trends presented in the leading textbooks of the subject. The teaching materials are available via Internet following the computer aided learning process principles. The illustrative materials of the lectures are refined using the latest IT equipment. Consequently, in 2006 the pharmacognosy teacher was selected by the pharmacy students as the best teacher of all medical subjects.

13.-15. The Accreditation Expert Team recommended to increase the research activity. They also emphasized an urgent need of new equipment and research collaboration.

ACTION TAKEN: The research activity (as reflected by the number of the ISI Web of Science indexed articles) has been increased during the last seven years, but has still to be considered as insufficient. There exists an urgent need of research equipment and the present research is based on the collaboration with private companies (HPLC apparatus, IR-spectrophotometer) or with other departments of Faculty of Medicine and outside (Department of Immunology, Department of Pharmacology, Department of Biochemistry, Department of Food Hygiene and Control, Estonian University of Life Sciences, Institute of Organic and Bioorganic Chemistry, Tallinn University of Technology) as well as abroad (University of Helsinki, Faculty of Pharmacy, Divisions of Pharmaceutical Technology, Biopharmaceutics and Social Pharmacy, Danish School of Pharmacy, Abo Academie, University of Sydney).

In 2009, there will be expected an improvement since a new, multidimensional targeted financing grant application is being prepared.

16. The Accreditation Expert Team recommended to involve the external professional pharmacists in a regular review of the programme.

ACTION TAKEN: External professional pharmacists (and not only) are involved to the programme development and teaching process. Considerable support have provided the clinical pharmacists of Tartu University Clinics, specialists of State Agency of Medicines, pharmacists from community pharmacies etc.

17.-18. The Accreditation Expert Team recommended to strengthen the student counseling and feedback system.

ACTION TAKEN: Quality Assurance at the university level is ensured as follows: before the registration to participate in the exam the students are obliged to fill via the Study Information System a feed-back questionnaire. The questions involve various fields of the teaching process such as teaching capability of the teacher, availability of the study materials, subject's content-related questions etc. The results of the questionnaire are sent to the respective teacher and his/her superior (the Head of department). Results of these evaluations are considered by reappointment of the teacher. Also, the Department of Pharmacy performs students' surveys which results are made available for all students. On the basis of these survey results the student counseling is changed or amended. In addition, the students of the Faculty of Medicine (incl. pharmacy students) have introduced a well functioning tutor system where the last years students give advice to the first and second year students.

19. The Accreditation Expert Team recommended to develop a set of new, contemporary subjects.

ACTION TAKEN: The new curriculum valid from 2006/2007 employs several new subjects of clinical pharmacy such as Primary Care Medicine, Laboratory Medicine, Clinical Microbiology, and Clinical Pharmacology never taught before.

The 2003/2004 curriculum already contained new subjects such as genetics, biotechnology, pharmacoeconomy and pharmacoepidemiology, physical pharmacy, pharmaceutical excipients, professional ethics, pharmaceutical terminology, introduction to pharmacy profession and history of pharmacy. Part of them were fully new subjects, part of them were before available as elective subjects.

The pharmacy curriculum has been changed during the last years for several times. The general trend is to reduce chemistry based subjects and to increase the proportion of clinical subjects. The pharmaceutical technology track has been also increased and justified and as separate subjects pharmaceutical excipients, physical pharmacy, design of pharmaceutical formulations, galenical pharmacy (manufacturing of pharmaceutical formulations) have been introduced. The proportion of biopharmaceutics has been increased, too.

Another very important part of the new curriculum in pharmacy is the research work that is a very popular subject among students. The pharmacy student organization (Pharmaceutical Society of the University of Tartu) annually organizes students and teachers (not only from Department of Pharmacy but also from other departments – pharmacology, microbiology, biochemistry, immunology etc.) meetings where the options and opportunities for the research work are described. The Estonian Academical Society of Pharmacy (which involves also the academic staff of the Department of Pharmacy) has established a special fund to support students' research work this fund is financially supported by the Tallinn Pharmaceutical Plant.

Further considerations addressed by the General Recommendations of the Joint Final Report of the Accreditation Expert Team, 2001

1. The Accreditation Expert Team expressed their concern regarding the insufficient continuing education of the academic personnel.

ACTION TAKEN: During the last years two teachers have visited foreign institutions for a longer period: one teacher spent one month at the University of Athens, the other teacher spent two months at the European Pharmacopoeia Library in Strasbourg and University of London. Altogether the success rate for the application of the continuing education grants and financing is still low.

2. The Accreditation Expert Team expressed their concern regarding archaic teaching and research premises of the Department of Pharmacy.

ACTION TAKEN: The Department of Pharmacy relocated 2005 into newly renovated Institute of Technology Building with all necessary modern working environment options. Apart the fact that some labs could have been bigger and another lecture hall would have been beneficial, the teaching environment has to be considered good and modern. Unfortunately, there is almost no progress in purchase of new laboratory equipment for teaching purposes and the teaching laboratory equipment should be considered as out of date.

3. The Accreditation Expert Team pointed out the need for additional study materials, in particular the English language textbooks, scientific journals and suggested to find a place for "quiet" study.

ACTION TAKEN: All these suggestions are followed. In the new building, the Department of Pharmacy has its own library, unique in the University of Tartu for a relatively small department, with quiet study places. The most famous textbooks are available, and from 2006 annually tens of new textbooks are ordered (from department, Faculty of Medicine, and university central library targeted funds). In addition, the local representative of MEPHA has created a special fund for purchase of textbooks. The students have an option of photo-coping and printing for a reasonable price. Via the university central library computer network there is an on-line access (both for teachers and students) for most of the scientific journals (11, 000 journals are available in full or at least in part). There is a computer room with 16 PCs for disposal of students (open till late evening), the department is covered with WiFi. The

general trend is to publish the lecture materials and guidelines for practicals on-line but also several Estonian language textbooks have been published during the last seven years. Overall, the study environment at the Department of Pharmacy (except the shortage of the equipment and laboratory supplies) is on top level among the departments of Faculty of Medicine.

4. The Accreditation Expert Team recommended to develop the life long and continuing education system for pharmacy graduates under the auspices of the Department of Pharmacy.

ACTION TAKEN: The life long and continuing learning of pharmacists is organized by the professional organizations of pharmacists. This is a traditional system typical to the Estonian pharmaceutical community and there is no need to restructure it. However, the Department of Pharmacy is involved in that process on many levels. Conceptually, the Department of Pharmacy representatives actively participate in the programme development, and *de facto* no life long and continuing learning programme or course is accepted before the department's approval. Typically, the Head of the Department of Pharmacy signs the certificates of such courses. Practically, most of the teachers act as lectures for the life long and continuing learning courses.

Conclusion

Most of the recommendations and concerns expressed in the Joint Final Report of the Accreditation Expert Team, 2001 are considered and followed. The Department of Pharmacy makes further efforts to increase the research activity, purchase new equipment, sustainably develop the academic personnel, and increase the overall productivity, efficiency, and competitiveness of the department.

11. GENERAL CONCLUSIONS OF THE SELF-EVALUATION

The Steering Group of the Self Evaluation Report, after careful analysis of the feedback from pharmacy students and academic staff of the Department of Pharmacy, informal discussions with the employees, and several formal Steering Group meetings concluded that recognizing

- the pharmacy as a part of the Estonian national and cultural heritage;
- the long historical traditions of the pharmacy teaching at the University of Tartu;

• the leading role of the Department of Pharmacy as a healthcare opinion former of the society; declaring the strengths such as

- talented and gifted students;
- experienced and professional teachers;
- good teaching environment;
- well-functioning quality assurance system;
- positively transforming department;

but also accepting and having an action plan for weaknesses such as

- unbalanced age distribution of academic personnel;
- obsolete and insufficient laboratory equipment;
- moderate while increasing research activity;

the pharmacy teaching curricula for

- pharmacy master studies programme;
- pharmacy doctoral studies programme;

fill

- the objectives set in the strategic plans of the University of Tartu and Faculty of Medicine;
- the expectations of the pharmacy students;
- the needs of the Estonian healthcare system and society;

and thus have to be considered

- as appropriate in the Estonian educational context and within the Nordic and European dimension
- of good overall quality and well-balanced between various aspects of the curricula
- as producing considerable added value for the people of the Republic of Estonia.

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APPENDIX I. QUESTIONNAIRE FORM FOR UNDERGRADUATE STUDENTS

Dear pharmacy master students!

In the autumn of 2008 the accreditation of the curriculum of the pharmacy master programme will take place, whereto an evaluation report is being assembled. A summary of assessments and opinions about learning and teaching arrangements by the pharmacy master students will be considered in writing of the above mentioned report. This questionnaire is anonymous.

Please read the questions carefully and answer according to the added instructions.

Prof. Peep Veski, Head of the Department of Pharmacy at the University of Tartu

1. Please describe the sources wherefrom did you receive the information concerning the pharmacy master studies.

(Please mark only one option!)

Parents
Friends, acquaintances
Pharmacists
Television
Other channels of mass communication
] Pharmacy
Elsewhere (where?)

2. Did you have an image of the pharmacy master studies before applying?

(Please mark only one option!)

Yes
To some extent
No

3. Did your prior image and the actual study coincide?

(Please mark only one option!)

Yes
To some extent
No

4. How many hours in a week do you study? ((Please mark only one option in the either column!) Lectures, seminars and laboratory work Independent work

<10	
11-20	
21-30	
31-40	
41-50	
>50	

5. How content are you with the following conditions concerning your studies in the Department of Pharmacy and in the other departments of the University of Tartu?

(Please write an answer to the each section in the both columns. First column applies for Department of Pharmacy, second column for other departments. For evaluation please use the following scale:)

0 = not at	1 = rather	2 = rather	3 =
all content	not	content	absolutely
	content		content

	Department of Pharmacy	Other departments at the University of Tartu
1. Access to the compulsory study materials and to		
the literature required for the independent work		
2. Availability of the teachers		

3.	Attitude of the teachers towards pharmacy	
	Sludenis	
4.	Access to the professional databases	
5.	Access to the computer	
6.	Means to copy	
7.	Opening hours of the library	

6. Is your progress in the pharmacy master studies hindered by the lack of the language skills? *(Please mark only one option!)*

To some extent
If you answered "Yes" or "To some extent", please specify these languages are problematic for
you.

7. How would you evaluate the number of the obligatory subjects in the pharmacy master curriculum? (Please answer in each line, using the scale given below:)
 3 = to much
 2 = fair amount
 1 = to little

1.	Chemistry (excluding_biological chemistry)	
2.	Physics-mathematics	
3.	Biology (including biological chemistry, botany, pharmacognosy and microbiology)	
4.	Medicine	
5.	Pharmaceutical technology and drug design (including galenics, physical pharmacy, excipients and biopharmacy)	
6.	Social sciences (including languages)	

8. Please specify the subjects you would like to add or remove from the pharmacy master curriculum. **To add: To remove:**

9. Please indicate three compulsory subjects in the pharmacy master curriculum wherewith you are content and not content.
Content: Not content:

10. Please give us your opinion on the following statements: *(Please answer in each line, using the scale given below:)*

 $\mathbf{2} = fair$ $\mathbf{1} = to small$

 $\mathbf{3} = \text{to big}$

	1. The amount of theoretical study compared to laboratory work is					
2. The amount of lectures/seminars/labs compared to independent work is						
	Concerning one year the amount of tin inter sessions is	ne spent on curri	culum studies	compared	to	
	4. The amount of specialized practice is					
11. H c (Ple	low content are you with the proportion of t surriculum? ase write an answer to following field u s	he elective subject sing the scale given 3 = to big	cts in the pharr ven below:) 2 = fair	nacy maste	er = to small	
12. F (Ple	low content are you with the number of the ase write an answer to following field us	elective subjects sing the scale ging a scale state	? ven below:) 2 = fair	1	= to small	
13. <i>(Pl</i> e	How content are you with the quality of taken as a write an answer to following field us	teachings of the sing the scale give	elective subjective su	ects?	2 –	
		all content	not content	rather content	absolute content	ly t
14. H (Ple	low content are you with the proportion of t ase write an answer to following field us	he free subjects in sing the scale gives 3 - to big	n the pharmac ven below:) 2 – fair	y master cu 1	urriculum?	
		9 – 10 big	2 – 101	•	- 10 3111	_
15. H	low content are you with the number of the	free subjects?	von bolowy)			
(Fie	ase write an answer to following held us	3 = to big	2 = fair	1	= to small	
16. (<i>Pla</i>)	Why all pharmacy students do not graduate ease mark only one option!) Financial reasons The curriculum is to difficult Family reasons Health issues Ailitary service Enjoying student life and its accompany er reasons (What?)	e within the standa	ard given time	(5 years)?		
17. \ N	Do you need to work to finance your studies 'es lo	s?				
18.	f yes, does it hinder your studies ? (Please	only mark one o 0 = not	option!) at all 1 = so	mewhat	2 = hinders	S
19.	Do you work in a medical facility?					

20. Where would you like to work after the graduation of pharmacy master studies? Where would you like to work after graduation?

(Please mark only one option!)

_	
	community pharmacy,
	hospital pharmacy,
	pharmaceutical industry,
	local representative office of a foreign drug manufacturer,
	wholesale company,
	governmental institution (State Agency of Medicines, Ministry of Social Affairs etc.),
	doctoral studies
	University of Tartu, Institute of Pharmacy,
	other work in the field of current specialty (please specify),

non-specialty work

Somewhere else (Where?)

21. Should students be incorporated to the development of a pharmacy curriculum? (*Please only mark one option!*)

	Yes,	defini	tely
--	------	--------	------

Rather yes, by expressing their opinion about existing subjects Rather no, students lack the required knowledge

No No

Questions 21-23 should only be answered by students, who have already started to work on Master's thesis.

22. How did you choose the subject of research?

(Please only mark one option!)

Prior interest

Interest manifested during the studies

- The field is scientifically perspective
- No preference on subject, the method used is important

I choose from the subjects that were offered first

Other (What?).....

23. Are you content with the subjects of research and their realization in the Department of Pharmacy and in the other departments of the University of Tartu?

(Please mark one option in each column!)

	Institute of	Pharmacy	Other institutes of University of Tartu		
	Subject Realizatio		Subject	Realization	
	n				
Yes					
To some					
extent					
No					

Questions 24-26 are to be answered only by the fifth year students.

24. Dose the practice at pharmacy provide all assignments required by the pharmacy master curriculum?

Please	only	mark	one	option!)
Yes				

☐ To some extent ☐ No

25. Is the tutorial work during the practice at pharmacy sufficient? (*Please only mark one option!*)

☐ Yes ☐ To some extent ☐ No					
 26. Does the pharmacy practice assure you the competence to work in the field of (Please only mark one option!) Yes To some extent No 	of pha	armad	у?		
27. Is there is anything else you would like to add about the studies in the Depart Please comment also, whether you consider it positive or negative.	ment	of Pl	narm	acy?	
I am currently on year <i>(Please circle the correct answer!)</i> Gender Male Eemale	1.	2.	3.	4.	5.
Native language					

Thank you!

APPENDIX II. ANALYSIS OF QUESTIONNAIRE FOR UNDERGRADUATE STUDENTS

Dear pharmacy master students!

In the autumn of 2008 the accreditation of the curriculum of the pharmacy master programme will take place, whereto an evaluation report is being assembled. A summary of assessments and opinions about learning and teaching arrangements by the pharmacy master students will be considered in writing of the above mentioned report. This questionnaire is anonymous. Please read the questions carefully and answer according to the added instructions.

Prof. Peep Veski, Head of the Department of Pharmacy at the University of Tartu

1. Please describe the sources wherefrom did you receive the information concerning the pharmacy master studies.



2. Did you have an image of the pharmacy master studies before applying?

	% of the
	respondents
Yes	16
To so	ome
extent	76
No	8

3. Did your prior image and the actual studies coincide?

	% of the respondents
Yes	45
To some	
extent	39
No	16

4. During the one week how many hours do you study?

Time (hours)	Auditory work (% of the respondents)	Independent work (% of the respondents)
<10	3	30
11-21	17	44
21-30	57	18
31-40	17	4
41-50	4	4
>50	2	-

5. How content are you with the following conditions concerning your studies in the Department of Pharmacy and in the other departments of the University of Tartu?





6. Is your progress in the pharmacy master studies hindered by the lack of the language skills?

	% of the respondents
Yes	6
To some	
extent	26
No	68

13% reported lack of knowledge in Estonian and 7% in Russian.

7. How would you evaluate the number of the obligatory subjects in the pharmacy master curriculum?



8. Please specify the subjects you would like to add or remove from the pharmacy master curriculum?

	To add (% of the responses, n=179)	To remove (% of the responses, n=182)
Chemistry	2	14
Physics-mathematics	7	25
Biology	3	14
Medicine	42	-
Pharmaceutical technology and rug design	6	6
Social sciences (including languages)	28	41
Practical work	12	-

9. Please indicate three compulsory subjects in the pharmacy master curriculum wherewith you are content and not content

	Content (% of the responses, n=349)	Not content (% of the responses, n=246)
Chemistry	16	27
Physics-mathematics	-	13
Biology	35	18
Medicine	35	14
Pharmaceutical technology and drug design	9	12
Social sciences (including languages)	5	16
Practical work	_	-

10. Please give us your opinion on the following statements

	The amount of theoretical study compared to laboratory work is (% of the respondents)	The amount of lectures/seminars/labs compared to independent work is (% of the respondents)	Concerning one year the amount of time spent on studies compared to intersessions is (% of the respondents)	The amount of specialized practice is (% of the respondents)
To small	8	5	10	57
Sufficient	80	85	61	40
Too big	12	10	29	3

11. How content you are with the proportion of the elective subjects in the pharmacy master curriculum?

	% of the respondents
Too small	14
Sufficient	66
Too big	20

12. How content you are with the number of the elective subjects?

	% of the
Option	respondents
Too small	56
Sufficient	42
Too big	2

13. How content you are with the quality of teachings of the elective subjects?

	% of the respondents
Not at all	
content	1
Rather not	
content	10
Rather content	67
Absolutely	
content	22

14. How content you are with the proportion of the free subjects in the pharmacy master curriculum?

	% of the respondents
Too small	23
Sufficient	62
Too big	15

15. How content you are with the number of the free subjects?

Option	% of the respondents
Too small	18
Sufficient	79
Too big	3

16. Why all pharmacy students do not graduate within the standard given time (5 years)?



17. Do you need to work to finance your studies?

Option	% of the respondents
Yes	33
No	67

18. If you work, does it hinder your studies?

Option	% of the respondents
No	2
To some	
extent	21
Yes	77

19. Do you work in the pharmacy (medical) field?

% of the	
Option	respondents
Yes	29
No	71

Other work in the University of Tartu field of current Non-specialty work Department of specialty 0% pharmacy 2% 0% Other Continuing in 7% doctoral studies community pharmacy 6% 29% Government institution 12% Hospital pharmacy 8% Wholesale Pharmaceutical Local office of a enterprise industry foreign 7% 14% drug manufacturer 15%

20. Where would you like to work after the graduation of pharmacy master studies?

21. Should students be incorporated to the development of a pharmacy master curriculum?

	% of the
Option	respondents
Yes, definitely	33
Rather yes, by expressing their opinion about existing	
subjects	62
Rather no, students lack the required knowledge	5
No	-

Questions 22-23 should only be answered by students, who have already started to work on Master's thesis.

22. How did you choose the subject of research?



23. Are you content with the subjects of research and their realization in the Department of Pharmacy and in the other departments of the University of Tartu?

	Department of Pharmacy (% of the respondents)		Other departments of the University of Tartu (% of the respondents)	
	Subject	Realization	Subject	Realization
Yes	45	71	35	62
To some extent	30	22	50	30
No	25	7	15	8

Questions 24-26 are to be answered only by the fifth year students.

24. Dose the practice at pharmacy provide all assignments required by the pharmacy master curriculum?

		% of the
		respondents
Yes		88
То	some	
extent		12
No		-

25. Is the tutorial work during the practice at pharmacy sufficient?

Ontion	% of the
Option	respondents
Yes	88
To some	;
extent	12
No	-

26. Does the pharmacy practice assure you the competence to work in the field of pharmacy?

Option	% of the respondents
Yes	76
To so	ome
extent	24
No	-

27. Is there anything else you would like to add about the studies in the Department of Pharmacy? Please comment also, whether you consider it positive or negative?

Option	Positivne comments (% of the respondents)	Negative comments (% of the respondents)
Curriculum	20	35
Teachers	31	9
Rooms, equipment, study materials, stipendiums	44	43
Practical experience	5	13

Demographic data

Year of the study Year 1: 26% Year 2: 25% Year 3: 19% Year 4: 17% Year 5: 13%

Sample size n=134 (90%)

Gender

Female 87% Male 13%

Native language Estonian 53%

Russian 47%

APPENDIX III. QUESTIONNAIRE FORM FOR ACADEMIC STAFF OF THE DEPARTMENT OF PHARMACY

The Department of Pharmacy academic employee's perception towards the pharmacy master programme at the University of Tartu, Estonia

1.	Please indicate your opinion toward imago of the Department of Pharmacy
0	Only one option!

- Good Rather good than poor
- Rather poor than good

Poor

Imago is improved by

Imago is impaired by

 	 	••••••

2. Does the Department of Pharmacy have the leading role in the pharmact sector of Estonia?

Only one option!

Rather yes than no

Rather no than yes

🗌 No

3. How do you evaluate:

Please answer in each line, use the scale 1 – good, 2 – rather good than poor, 3 – rather poor than good, 4 – poor

3.1. management of the Department of Pharmacy	
3.2. cooperation between the Department of Pharmacy and other	
parties in the pharmacy sector	
3.3. cooperation between the Department of Pharmacy and the other	
departments at the University of Tartu	
3.4. pharmacy master curriculum	
3.5. the level of knowledge of pharmacy students	

4. How do you evaluate the percentage of following subjects in the pharmacy master curriculum?

Please answer in each line, use the scale 1 – excessive, 2 – optimum, 3 – not enough

4.1. Chemistry	
4.2. Physics-matemathics	
4.3. Biology (including biological chemistry, botany, pharmacognosy	
and microbiology)	
4.4. Medicine	
4.5. Pharmaceutical technology and design of medicinal products	
(including galenics, physical pharmacy, excipients and biopharmacy)	
4.6. Social sciences	

5. How do you evaluate the following formats of teaching in the pharmacy master curriculum?

Please answer in each line, use the scale 1 – excessive, 2 – optimum, 3 – not enough

Lectures	
Laboratory works,	
seminars	
Elective subjects	
Independent work	
Practice at	
community/hopsital	
pharmacy	

6. How do you evaluate the study discipline of the pharmacy students?

	Only one option!
	Good
	Rather good than poor
	Rather poor than good
_	_ '

Poor

7. Do you get a feedback from the pharmacy students concerning the quality of your work (teaching of obligatory subjects, elective courses, etc.)? Only one option!

Only one optior
Yes
No

How do you get the feedback?

 	 ••••••
 	 ••••••

8. How the pharmacy students contact you?

Please answer in each line, use the scale 1 – frequently, 2 – occasionally, 3 – rarerly

In case of need	
pharmacy students can	
contact teaching staff at	
suitable time and place	
By phone	
By e-mail	

Other possibility, please specify.....

9. Do the pharmacy students need to participate at the development of the pharmacy master curriculum?

Only one option!

Yes
Rather yes than no

Rather no than yes

🗌 No

10. Is the number of staff (teachers/scientists) at the Department of Pharmacy sufficient to teach the pharmaceutical subjects?

Only one option!
Yes
Rather yes than no
Rather no than yes
No

11. Do the staff members have sufficient competency to teach the pharmaceutical subjects? *Only one option!*

☐ Yes
☐ Rather yes than no
☐ Rather no than yes

_ No

12. What do you need for the providing of quality teaching?

Please answer in each line, use the scale 1 – frequently, 2 – occasionally, 3 – rarerly

Rooms	
Presentation technique	
for lectures	
Literature	
Equipments and other	
technical resources	
Reactives	
Possibility to	
communicate with the	
patients	

Something else, please specify.....

13. How the labour conditions have changed during the last ten years?

 	 	••••••

14. Is there need to develop/change the system of professional continuing education at the University of Tartu?

Only one option!

🗌 Yes

Rather yes than no

Rather no than yes

🗌 No

15. Are you regularly employed at

the Department of Pharmacy

the Department of Pharmacy and in other department/institution/company/pharmacy etc.

16. Your workload is

Only one option!
] High
Sufficient
Low

17. Please indicate the proportions of the following assignments in your regular working day

Please answer in each line, use the scale 1 – excessive, 2 – optimum, 3 – not enough

Teaching	
Research	
Administrative work	

Something else, please specify.....

18. Do the number of lectures/practical works/seminars of the subjects taught by you should be

Only one option!
Higher
Lower
It is sufficient

19. Are you satisfied with the location of the subjects taught by you in the timetable of the pharmacy master studies (too early, too late etc.)?

Only one option!
Yes
Rather yes than no
Rather no than yes

□ No

If the answer is negative, please indicate the problems.

Please enclose here any information concerning working at Institute of Pharmacy or pharmacy master studies.

Thank you!

APPENDIX IV. ANALYSIS OF THE QUESTIONNAIRE FOR ACADEMIC STAFF OF THE DEPARTMENT OF PHARMACY

The Department of Pharmacy academic employee's perception towards the pharmacy master programme at the University of Tartu, Estonia

1. Please indicate your opinion toward imago of the Department of Pharmacy

% of the
respondents
16
42
42
-

Imago is improved by

Research (increased number of scientific publications, more PhD students) Studies (new curriculum, modern equipment, novel teaching methods) Rooms (new, well-equiped) Personnel (professional competence) Collaboration (different departments at the University of Tartu, other parties within pharmacy sector)

Imago is impaired by

Research (lack of finances and equipment) Studies (inflexibility of the teaching process) Personnel (professional incompetence, age related structure of the personnel) Collaboration (the Department of Pharmacy is isolated, arrogance of the physicians) Public view (negative image of the pharmacists in the mass media; pharmacist is not considered as health care professional)

2. Does the Department of Pharmacy have the leading role in the pharmact sector of Estonia?

	% of the
	respondents
Yes	16
Rather yes than no	42
Rather no than yes	34
No	8

3. How do you evaluate:

	% of the respondents
3.1. management of the Department of Pharmacy	good 58, rather good than poor 34, rather poor than good 8
3.2. cooperation between the Department of Pharmacy and other parties in the pharmacy sector	good 9, rather good than poor 46, rather poor than good 45
3.3. cooperation between the Department of Pharmacy and the other departments at the University of Tartu	good 18, rather good than poor 36, rather poor than good 46
3.4. pharmacy master curriculum	good 55,

	rather good than poor 36, rather poor than good 9
3.5. the level of knowledge of pharmacy students	rather good than poor 91, rather poor than good 9

4. How do you evaluate the percentage of following subjects in the pharmacy master curriculum?

	% of the
	respondents
4.1. Chemistry	excessive 36,
	optimum 55,
	not enough 9
4.2. Physics-matemathics	excessive 9,
	optimum 82,
	not enough 9
4.0. Diele m. (in studie e biele sigs) stremister.	
4.3. Biology (including biological chemistry,	excessive 9,
botany, pharmacognosy and microbiology)	optimum 82,
	not enough 9
4.4. Medicine	optimum 45.
	not enough 55
	6
4.5. Pharmaceutical technology and	excessive 9,
design of medicinal products (including	optimum 82,
galenics,	not enough 9
physical pharmacy, excipients and	
biopharmacy)	
4.6. Social sciences	excessive 9,
	optimum 82,
	not enough 9

5. How do you evaluate the following formats of teaching in the pharmacy master curriculum?

Lectures	% of the respondents excessive 27,
Laboratory works,	excessive 9,
seminars	optimum 55, not enough 36
Elective subjects	excessive 9, optimum 82, not enough 9
Independent work	optimum 73, not enough 27
Practice at community/hopsital pharmacy	optimum 91, not enough 9

6. How do you evaluate the study discipline of the pharmacy students?

	% of the
	respondents
Good	17
Rather good than	67
poor	
Rather poor than	16
good	

7. Do you get a feedback from the pharmacy students concerning the quality of your work (teaching of obligatory subjects, elective courses, etc.)?

	% of the
	respondents
Yes	75
No	25

How do you get the feedback?

Study information system, discussion with the students, prelims and exams.

8. How the pharmacy students contact you?

	% of the respondents
In case of need pharmacy students can contact teaching staff at suitable time and place	frequently 73, occasionally 27
By phone	frequently 18, occasionally 27, rarerly 55
By e-mail	frequently 45, occasionally 27, rarerly 28

9. Do the pharmacy students need to participate at the development of the pharmacy master curriculum?

	% of the respondents
Yes	25
Rather yes than no	25
Rather no than yes	41
No	9

10. Is the number of staff (teachers/scientists) at the Department of Pharmacy sufficient to teach the pharmaceutical subjects?

	% of the
	respondents
Yes	9
Rather yes than no	36
Rather no than yes	19
No	36

^{11.} Do the staff members have sufficient competency to teach the pharmaceutical subjects?

	% of the respondents
Yes	18
Rather yes than no	44
Rather no than yes	18
No	19

12. What do you need for the providing of quality teaching?

	% of the
	respondents
Rooms	occasionally 25,
	rarerly 75
Presentation technique	occasionally 33,
for lectures	rarerly 67
Literature	occasionally 67,
	rarerly 33
Equipments and other	frequently 58,
technical resources	occasionally 25,
	rarerly 17
Reactives	frequently 18,
	occasionally 82
Possibility to	occasionally 27,
communicate with the	rarerly 73
patients	-

13. How the labour conditions have changed during the last ten years?

Improvement due to the removing to the new building.

14. Is there need to develop/change the system of professional continuing education at the University of Tartu?

	% of the
	respondents
Yes	16
Rather yes than no	58
Rather no than yes	26

15. Are you regularly employed at

	% of the respondents
the Department of Pharmacy	92
the Department of Pharmacy and in other department/institution/company/pharmacy etc.	8

16. Your workload is

	% of the respondents
High	42
Sufficient	50
Low	8

17. Please indicate the proportions of the following assignments in your regular working day

	% of the
	respondents
Teaching	excessive 16,
_	optimum 84
Research	excessive 9,
	optimum 64,
	not enough 27
Administrative work	excessive 10,
	optimum 70,
	not enough 20

18. Do the number of lectures/practical works/seminars of the subjects taught by you should be

	% of the
	respondents
Higher	8
Lower	92

19. Are you satisfied with the location of the subjects taught by you in the timetable of the pharmacy master studies (too early, too late etc.)?

	% of the respondents
Yes	58
Rather yes than no	34
No	8

Sample size n= 12 (100%).

APPENDIX VII BRIEF HISTORY OF THE UNIVERSITY OF TARTU

On 30 June 1632, King Gustav II Adolf of Sweden signed the Foundation Decree of Academia Dorpatensis, which enables us to mark the beginning of our university's history. The following stages can be observed in the history of the University of Tartu.

1632-1710 Academia Dorpatensis (Tartu University during the Swedish times)

* Academia Gustaviana 1632-1665

* Academia Gustavo-Carolina 1690-1710

The first students matriculated between 20-21 April 1632. The opening ceremony of *Academia Dorpatensis* (*Academia Gustaviana*) took place on 15 October in the same year. The academy in Tartu functioned with the faculties of Philosophy, Law, Theology and Medical, enjoying the privileges of the University of Uppsala. On account of the Russian-Swedish war the University of Tartu was transferred to Tallinn in 1656 and closed in 1665.

In 1690 Tartu became a university town again to host *Academia Gustavo-Carolina*. Shortly after that, however, the university was transferred from Tartu to Pärnu due to a coalition against Sweden and the Great Famine of 1695-1697. Opened in Pärnu on 28 August 1699, *Academia Gustavo-Carolina* was closed on 12 August 1710 because of the surrender of the Swedish army to the Russian forces during the Northern War.

1802-1918 Kaiserliche Universität zu Dorpat (The Imperial University of Tartu)

* Imperatorskij Jur'evskij Universitet 1893-1918

At the end of the 18th century the political and educational interests of the Russian central government and the Baltic-German elite coincided. On 21-22 April 1802 the university was reopened in Tartu as a provincial Baltic university depending upon the local knighthoods - it was titled *Kaiserliche Universität zu Dorpat* (also *Imperatorskij Derptskij Universitet*). The charter of 12 December 1802, endorsed by Czar Alexander I, gave the university the legal status of a Russian state university, with German as the language of instruction. In 1828-1838 future university professors in Russia were taught at the University of Tartu Professors' Institute. In 1803 a lecturership of the Estonian language was established and in 1838 the Learned Estonian Society (Gelehrte Estnische Gesellschaft) was founded at the university.

Tartu University obtained the monopoly of higher education in the western provinces of the Russian Empire, forming close relationships with the Academy of Sciences in St. Petersburg in the east and with German universities in the west. During the russification campaign beginning in 1889 Tartu University was converted into *Imperatorskij Jur'evskij Universitet*, a traditional higher education establishment. In 1895, the Russian language was introduced as the language of instruction. In spite of great changes in the student body and the faculty, the University of Tartu in its capacity of a Russian university remained an international centre of science. What made University of Tartu unique throughout Russia was its role in educating distinguished scientists in every field of research and high-ranking officials for the Empire, especially in the fields of law and diplomacy.

In the turmoil of World War I the academic life of the university was interrupted by several stages of evacuation of its students, professors and property to Russia. In the spring of 1918 the Russian university was closed down and what is known as a voluntary departure of Russians opened up the path to a new provincial university to be launched by the German occupation forces – *Landesuniversität in Dorpat*, in the Baltic Duchy. Called Land University, it was opened on 15 September 1918. In a few months' time, however, it was forced to close. On 27 November 1918 the commander of the military forces transferred the jurisdiction over the University of Tartu to a commission formed by the Provisional Government of Estonia.

Note: The dates until 1 February 1918 are given according to the old calendar.

1919-1940 Tartu University of the Republic of Estonia

Preparatory work for the opening of the university had already started in March 1918. The Head of the Commission formed by the Provisional Government of Estonia Peeter Põld was appointed the university's curator (later a professor of pedagogy, the Pro-Rector and a doctor *honoris causa*). On 1 December 1919 the university opened its doors as *Tartu University of the Republic of Estonia*, with

Estonian as the language of instruction, at which new subjects laying the foundation for the development and research of Estonian national culture were taught.

1940-1941 Tartu State University

In 1940/1941, the first academic year under Soviet rule, the students' corporations and academic societies were closed and scientific contacts with West-European centres of research and universities were interrupted. The curricula of Tartu University were replaced by those officially imposed in the Soviet Union: a course system was adopted and obligatory political subjects based on the new Marxist-Leninist ideology, including the history of the USSR, were introduced.

1942-1944 Tartu University of the Estonian Self-Government under Nazi German Rule (Ostland-Universität in Dorpat)

Ostland-Univesität in Dorpat was opened by the German occupation government, with German as its language of instruction. It was to serve the whole Baltic region. Taking into consideration the needs of the time, the university was opened as Tartu University of the Estonian Self-Government, with instruction in Estonian where the University Act of 1938 regulated the academic life. During the war the faculties of Medicine, Veterinary Medicine and Agriculture were given the priority status.

During World War II the university lost 22 buildings, a considerable amount of its property, the accommodations of its academic and administrative staff and its libraries.

1944-1989 Tartu State University

In the autumn of 1944 the incomplete structural reforms interrupted in the summer of 1941 were continued. The university was subordinated to the People's Education Commissariat of the Estonian SSR (a ministry since 1946) and, beginning from 1946, to the Ministry of Higher Education of the Soviet Union.

Even in the 1960s the majority of the professors of Tartu State University belonged to the generation who had obtained their education at Tartu University in the Republic of Estonia and thus upheld the continuity of traditions in the processes of instruction and scientific research.

Since 1989 – The University of Tartu

The years since 1989 have been ones of structural changes amid the restoration of the content of academic studies and of the old traditions, both having been considered to be of crucial importance. New faculties and colleges were (re)founded: in 1991 Faculty of Theology, in 1992 Faculty of Philosophy and Faculty of Social Sciences, in 1996 Pärnu College and Türi College, in 1998 Euro College and in 1999 Narva College. Viljandi Culture Academy merged the university in 2005.

Intellectual freedom has been restored, Western-type systems of study and grading have been introduced, the standards for election to higher academic positions have been reviewed and contacts with European and other universities have been expanded, including an extensive student exchange programme. In 1996 the Open University was established to provide opportunities for life-long learning for all those interested in it without causing serious disruptions in their everyday lives.

On 19 June 1999 the Republic of Estonia signed the Bologna Declaration. The programme set out in the Declaration is based on a clearly defined goal: to create a European space for higher education in order to enhance the employability and mobility of citizens and increase the international competitiveness of European higher education. At the university it led to the adoption in 2001 of new curricula, which in most fields distinguished undergraduate studies (3-year bachelor's curricula) and graduate studies (2-year master's curricula and 4-year doctor's curricula). These changes led to other ones in admission policies at several faculties in 2004.

In 2006, a structure reform was launched, the result of which should be to decrease the disciplinary barriers, increase structural flexibility and the concentration of human and material resources to be more competitive. The structure of the university consists of three levels: the university, which is divided into 4 fields – *humaniora, medicina, sociala* and *realia et naturalia*, a faculty (or a college) and an institute (or a department). The chairs have been abolished in operation of structural reform.

APPENDIX IX. THE STRUCTURE OF THE UNIVERSITY OF TARTU (stand: April, 15, 2008)

Abbreviation	Structure (structural unit)
(code)	

Γ

		FACULTIES
US		FACULTY OF THEOLOGY
US	US	Dean's Office
οι		FACULTY OF LAW
OI	OI	Dean's Office
OI	AO	Institute of Public Law
OI	EO	Institute of Private Law
AR		FACULTY OF MEDICINE
AR	AR	Dean's Office
AR	AN	Department of Anatomy
AR	вк	Department of Biochemistry
AR	FR	Department of Pharmacology
AR	FS	Department of Physiology
AR	МВ	Department of Microbiology
AR	PA	Department of Pathological Anatomy and Forensic Medicine
AR	тн	Department of Public Health
AR	MP	Department of General and Molecular Pathology
AR	FA	Department of Pharmacy
AR	AI	Department of Anesthesiology and Intensive Care
AR	НО	Department of Haematology and Oncology

AR	KA	Department of Cardiology
AR	KI	Department of Surgery
AR	KS	Department of Pulmonology
AR	KR	Department of Oto-Rhino-Laryngology
AR	LA	Department of Pediatrics
AR	NH	Department of Dermatology
AR	NS	Department of Obstetrics and Gynecology
AR	NR	Department of Neurology and Neurosurgery
AR	РО	Polyclinic
AR	PS	Department of Psychiatry
AR	SI	Department of Ophthalmology
AR	SK	Department of Internal Medicine
AR	SM	Department of Sports Medicine and Rehabilitation
AR	то	Department of Traumatology and Orthopaedics
AR	ST	Department of Stomatology
AR	от	Department of Nursing Science
AR	тк	Centre for Continuing Medical Education
AR	VI	Vivarium
FL		FACULTY OF PHILOSOPHY
FL	FL	Dean's Office
FL	AJ	Institute of History and Archaeology
FL	EE	Institute of Estonian and General Linguistics
FL	FI	Institute of Philosophy and Semiotics
FL	GR	Institute of Germanic, Romance and Slavonic Languages and Literatures

FL	KU	Institute for Cultural Research and Fine Arts
FL	KE	Language Centre
FL	ET	Centre for Ethics
нт		FACULTY OF EDUCATION
НТ	НТ	Dean's Office
кк		FACULTY OF EXERCISE AND SPORT SCIENCES
КК	кк	Dean's Office
КК	SB	Institute of Exercise Biology and Physiotherapy
КК	SP	Institute of Sport Pedagogy and Coaching Science
LO		FACULTY OF
LO	LO	Dean's Office
LO	МІ	Estonian Marine Institute, University of Tartu
LO	FY	Institute of Physics, University of Tartu
LO	кт	Institute of Chemistry
LO	MR	Institute of Molecular and Cell Biology
LO	ОМ	Institute of Ecology and Earth Sciences
LO	ТІ	Institute of Technology, University of Tartu
MJ		FACULTY OF ECONOMICS AND BUSINESS ADMINISTRATION
MJ	MJ	Dean's Office
MJ	RI	Institute of Economics
MJ	JV	Institute of Business Administration
MJ	CV	Centre for Entrepreneurship
мт		FACULTY OF MATHEMATICS AND COMPUTER SCIENCE
МТ	МТ	Dean's Office

МТ	AT	Institute of Computer Science
МТ	MM	Institute of Mathematics
МТ	MS	Institute of Mathematical Statistics
SO		FACULTY OF SOCIAL SCIENCES
SO	SO	Dean's Office
SO	ZU	Institute of Journalism and Communication
SO	RG	Institute of Government and Politics
SO	PH	Institute of Psychology
SO	SS	Institute of Sociology and Social Policy
SO	сс	Centre for Baltic Studies
		Estonian Social Science Data Archive (consortium)
		Estonian Centre of Behavioural and Health Sciences (consortium)

ADMINISTRATIVE AND SUPPORT STRUCTURE		
RE		Rector
RE	AA	Rector's Office
P2		Vice-Rector for Academic Affairs
P2	00	Department of Academic Affairs
P2	AV	Open University Centre
P1		Vice-Rector for Research
P1	ТА	Department of Research and Institutional Development
P1	VS	International Relations Office

SPHERE OF RESPONSIBILITY		
DA		Director of Administration
DA	UK	Administrative Department
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DA	PR	Personnel Department
DA	КО	Communications Office
DF		Finance Director
DF	RH	Department of Finances
DH		Managing Director
DH	HB	Office of the Managing Director
DH	ΚV	Department of Real Estate Management
DH	IT	Department of Information Technology Services

COLLEGES and INSTITUTIONS OF THE UNIVERSITY		
P2	EC	EuroCollege, University of Tartu
P2	NC	Narva College, University of Tartu
P2	PC	Pärnu College, University of Tartu
P2	тс	Türi College, University of Tartu
P2	VK	Viljandi Culture Academy, University of Tartu
DH	UM	University of Tartu Museums
DH	BA	Botanical Garden, University of Tartu
P1	RT	University of Tartu Library
P2	TP	The Gifted and Talented Development Centre, University of Tartu
P1	GV	Estonian Genome Project, University of Tartu

APPENDIX X. THE STRUCTURE OF THE FACULTY OF MEDICINE

Preclinical departments

Den entre ent ef	. Descende en the velationalis between bisk made evidetive stress
Department of	Research on the relationship between high grade oxidative stress
Biochemistry	and inflammation (cardiovascular diseases, endothelium
	dysfunctionality, neurodegenerative diseases).
	 Design, synthesis and characterization of new peptide and non-
	peptide molecules with therapeutic potential (cellpenetrating peptides,
	antioxidants, peptide nucleic acids)
Department of	Research focuses on fundamental processes controlling brain
Pharmacology	damage and plasticity in various neurodegenerative and
Thannacology	nouropovobiotrio disordoro:
	Dele of mitachandrial dusfunction in neurodesenarctive disorders
	• Role of millochondrial dystunction in neurodegenerative disorders
	• Role of neuronal cell adnesion molecules in neuronal plasticity,
	learning and memory
	 Role of adult neurogenesis in brain function
	 New targets and elucidation of their roles in brain diseases aimed at
	developing new treatment strategies
Department of	Gene-based approaches to research molecular mechanisms of
Physiology	neurodegenerative and emotional disorders; the impact of gene
,,	polymorphisms on disease risk in depressive disorders, anxiety-
	induced changes in gene expression in the brain and behavioural
	changes in mice with deficient target gapes
	Development of non-investive measuring methods for determining
	• Development of non-invasive measuring methods for determining
	the parameters of blood circulation and breatning
Department of	 Human microbial ecology and its influence on the pathogenesis of
Microbiology	chronic diseases
	Antioxidative and antibacterial characteristics of intestinal lactobacilli
	and their application in functional foods
	 Interaction between HIV and the host organism, the role of the
	variability of virus genetic structure in the pathogenesis of HIV
	infection and in the development of drug resistance
	Pharmacokinetic/nbarmacodynamic properties of antiinfective drugs
	in the neepetal period
Department of Caparal	Disease related sens polymerphisms sens mytations and
Department of General	• Disease-related gene polymorphisms, gene mutations and
and Molecular Pathology	chromosome aberrations in eye diseases, intertility, and multifactorial
	diseases
	 The characterisation of human neural stem cells with potential for
	therapeutic treatments of neurological disorders
	 Studies of cell bioenergetics, primarily aimed at explaining the
	mechanisms of intracellular regulation of mitochondrial function in
	health and disease • Immune mechanisms in autoimmune and
	microorganisminduced inflammatory disorders (endocrine
	autoimmune diseases, coeliac disease. Helicobacter son related
	dispasses)
	• The rele of autoimmune regulator gone (AIRE) in the development of
	• The fole of autoinmune regulator gene (AIRE) in the development of
Department of Anatomy	Research in reproductive biology: the biochemistry and molecular
	biology of the mechanisms of luteolysis, regulation of active and
	passive molecular transport in the male reproductive tract
	The clinical morphology, functional anatomy and biomechanics of
	the human locomotive system
Department of	Studies on pathogenetic mechanisms of brain gliomas and the
Pathological Anatomy	development of tissue chip technology for tissuebased expression
and Forensic Medicine	analysis
	The effects of ethanol consumption and the social and forensic
	senance of mistrastment of children
Doportmont of Dublic	aspects of thistied intention of multipleting as a sublic health consists and
	Evaluation of the availability and quality of public health services and backle as an availability and quality of public health services and
Health	health care

	 The epidemiology of HIV and other sexually transmitted diseases in Estonia Studies of the relationship between personality traits and risk-prone behaviour
Department of Pharmacy	 Biopharmaceutical investigation of pharmaceutical formulations – determination and improvement of quality Factors influencing drug communication in Estonian pharmacies The investigation of chemotypes of essential oil containing medicinal plants

Clinical departments

Department of	• Hematopoietic stem cell transplantation in the treatment of malignant
Haematology and	and non-malignant diseases
Oncology	 Cell therapies in correction of immune response and
	histocompatibility problems
Department of	Risk factors for, treatment and prognosis of myocardial ischemia
Cardiology	and myocardial infarction
	 The function of endothelium in cardiovascular diseases
Department of	 Pharmacokinetics of antibiotic drugs in septic shock
Anaesthesiology and	 Incidence, risk factors and prevention of gastrointestinal failure in
Intensive Care	intensive care patients
	 Hyperoxic preconditioning in cardiac surgery; the longterm outcome
	of patients resuscitated from sudden cardiac arrest
Department of Surgery	Associations between peptic ulcer diseases and Helicobacter pylori
	infection: long-term results of different treatment modalities
	Mechanisms of pathogenesis of peptic ulcer and gastric cancer and
	development of new diagnostic markers
	Role of intraoperative cholangiography and postoperative pain
	control in laparoscopic cholecystectomy
Department of Family	• Epidemiology of Helicobacter pylori infection in children and adults,
Medicine	relationship between chronic gastritis, peptic ulcer and Helicobacter
	pylori
	 Depression in primary health care: health and life-style factors in
	prediction of the risk for depression
	 Doctor-patient relationship, patients' expectations and satisfaction
	with family doctor consultation
Department of	• Mechanisms of airway inflammation and remodelling in inflammatory
Pulmonology	pulmonary diseases
	 Challenges in tuberculosis - trends in epidemiological indicators;
	spread
Department of	• Epidemiology, molecular mechanisms, clinical picture and outcome
Paediatrics	of developmental disorders and chronic diseases during childhood
	and adolescence
	Allergic diseases in childhood
	Olfactory development in newborn children
Department of	 The role of oxidative stress in the pathogenesis of dermatitis and
Dermatology	eczema
	 The relationships between gene polymorphisms of interleukin-10
	family cytokines, psoriasis and vitiligo
Department of Obstetrics	• The genetic, immunological and biochemical aspects of infertility
and Gynaecology	 Reproductive behaviour, knowledge, attitudes and the use of
	reproductive health services in Estonia
Department of Neurology	 Epidemiology of neurological diseases and quality of life
and Neurosurgery	 Molecular neuropathology and mechanisms of glioma invasion
Department of Psychiatry	The epidemiology of mental disorders
	The psychosocial and biological factors of mental disorders
	(schizophrenia, mood and anxiety disorders)
Department of Internal	• The epidemiology of chronic internal diseases and the factors

Medicine	affecting the course of diseases and their treatment (joint diseases, type II diabetes, renal diseases) • Pathogenetic mechanisms of vascular damage in transplanted kidneys
Department of Ophthalmology	 Exfoliation syndrome (epidemiology, corneal endothelial cell changes in exfoliation syndrome undergoing cataract surgery) Assessment of ultrastructural changes after glaucoma operations using confocal laser scanning microscopy
Department of Oto- Rhino-Laryngology	 Pathogenesis and treatment of functional and anatomical stenoses of upper airways Pathogenesis and treatment of focal infections of upper airways Genetic and environmental aspects of hearing impairment in Estonia
Department of Sports Medicine and Rehabilitation	 Early complex rehabilitation of patients after surgical revascularization of the myocardium and after hip or knee joint arthroplasty
Department of Traumatology and Orthopaedics	 The diagnostics of osteoarthrosis and the clinical, anatomic and biomechanical aspects related to its treatment
Department of Stomatology	 Epidemiology and prevention of oral and dental diseases Etiology, pathogenesis and clinical aspects of periodontal disease, odontogenic tumours and temporomandibular joint disorders Genealogical and genetic study of cleft

Structural Units

Dean's Office	
Centre of Molecular and Clinical Medicine (Restructuring in progress)	The Centre of Molecular and Clinical Medicine was founded in 2001, and it aims to facilitate cutting-edge medical research, in neuroscience in particular. The Centre consists of eleven research groups, including most of the preclinical and three clinical departments of the Faculty of Medicine. In 2002, the Centre received the highest possible rating from the European Commission in the Call for Accompanying Measures for East-European Centres of Excellence and was recognized as a European Centre of Excellence. The interdisciplinary Doctoral School of Neuroscience is also closely involved in the activities of the Centre.
Vivarium (Animal Department)	 Ordering, housing, and supply of laboratory animals to researchers Control and promotion of laboratory animal well-being
Centre of Continuing Medical Education (ARTK)	Provides courses in medical and pharmaceutical continuing education

APPENDIX XV. HISTORY OF TEACHING OF PHARMACY AT THE UNIVERSITY OF TARTU

There are three distinguishable periods in the history of teaching pharmacy at The University of Tartu.

I period lasted form 1632 until the end of the 18th century. The first connections, although still distant, can be found starting from the foundation of the university. For the Faculty of Medicine, the institutional law of Academia Gustaviana predicted two professorships which were supposed to cover also botany and use of drugs in treatment of various diseases. De facto the only professor of medicine who started working here was Johannes Raicus from Uppsala University. Besides everything else he also taught means of folk medicine. In the middle of the 17th century prof. Sebastian Wirdig was leading research about dysentery and pharmaceutical possibilities for its treatment. The issue about necessity for teaching pharmacy was risen in 1689 in the university constitution that also described the need for a University Pharmacy. By the same constitution the professor of medicine was obliged to audit the City Pharmacy of Tartu. For several years the City Pharmacy continued its work under university surveillance until in 1696 the pharmacy was taken under full jurisdiction of the university and Gottfried Hasenfelder became the first university pharmacist. In 1699, professor of medicine Laurentius Braun lectured besides physiology and pathology also pharmacology. In 1699, the university was located in Pärnu. The City Pharmacy of Pärnu had close contacts with the university, which had to audit the pharmacy. The pharmacy delivered free medication to the poorer students. In 1705, the owner of Pärnu city pharmacy Christian Heno became the university pharmacist. Due to Great Nothern War (1710-), the functioning of the university and consequently the Faculty of Medicine was ceased for about 90 years.

Il period: Period of Russian tsarism from the beginning of the 19th century until 1918.

On May 4th 1799, the Russian Tsar Peter I signed the project of the university which included also a combined professorship for chemistry and pharmacy. In 1800, the city pharmacist of Tallinn, Philipp Arzt got that first professorship. His tasks were to equip laboratories and make all preparations for teaching. Most unfortunately, he drowned in 1802 and the organising process was ceased for some time. In 1803-1804, his work was continued by a chemist Alexander Nicolaus Scherer, who was the first professor of theoretical and applied chemistry. Thanks to him, Tartu was the first place in Russia where teaching system was established according to the newest scientific principles at the time. Professor left Tartu already in a year and the teaching was ceased again. University constitution from 1803 predicted among six professorships in the Faculty of Medicine also chairs for dietotherapy, teaching in drug substances (materia medica), and history and literature of medicine. Materia medica was taught mostly by M.E. Styxil, G.F.E. Sahmen and J.F. Erdmann. In the middle of the century there occurred a big change in teaching drug substances and their effects. R.R. Bucheim is considered as the promoter of experimental pharmacology in Tartu as well as in the whole world. Later his work was continued by his students F. Oesterlen and J.E.O. Schmiedeberg. In 1805-1814, a pharmacist from Riga, David Hieronymus Grindel was the professor of chemistry and pharmacy. He was elected to the principal (rector) of the university in 1810, and, interestingly, in 1820-1823 he was a medical student of the same university. Grindel was known by his research in galvanics and among other monographies and textbooks also as an author of a textbook in pharmaceutics. In 1814-1821, the professorship of chemistry and pharmacy was held by a previous professor of chemistry from University of Harkov -Johann Emmanuel Ferdinand Giese. He is known for his 5-volume chemistry textbook and also several works in the field of pharmaceutics. In 1821, prof. Giese died on his way to Germany and finding a replacement for him took some years. In 1823-28, this position was held by Gottfried Wilhelm Osann. He is known at the first place as a chemist who worked with platinum metals, his work led to discovery of ruthenium by C. Claus later on. In 1828-1851, the professorship was held by Carl Christoph Traugott Friedemann Goebel from Jena, who during these decades of work achieved significant development of chemistry and pharmaceutics in Tartu. What comes to pharmaceutics, he was most involved in pharmacognosy and was in the lead of several pharmaco-botanical expeditions. He also made a huge contribution to establishment of independent professorship in pharmaceutics, although his own career continued in the field of chemistry.

October 19th 1842, Russian Tsar Nikolai I established an independent professorship in pharmaceutics at Tartu University. In 1843-1850, this first professorship was held by Carl Friedrich Eduard Siller. Prof. Siller was and is most appreciated for enlarged collection of herbs and pharmaceutical preparations and a two-volume textbook in pharmaceutics. On June 10th 1844, the constitution of the Department of Pharmacy was signed. The document stated regulations for personnel and specified the quarters and equipment for the department. The founded independent Department of Pharmacy was the first of the kind in Russia and among the first ones in the world. Due to its outstanding and modern equipment,

the department and Tartu became acknowledged as a scientific centre of pharmaceutics in Russia as well as worldwide. In 1850-1852, the professorship was held by Carl Ernst Heinrich Schmidt who is more known by his work in forensic chemistry, clinical microscopy and especially in physiology. In 1852-1864, a chemist Carl Ernst Claus had the professorship in pharmaceutics. He is known for discovering Ruthenium from platinum ore. During his time in Tartu, he was working in phytochemistry but returned to organic chemistry later on. In 1864-1894, the Department of Pharmacy was led by the world-famous Johann Georg Noel Dragendorff. As a scientist, he is known by his work in court chemistry/pathological chemistry and pharmacognosy but also as an author of several textbooks and monographs. He is considered as the greatest promotor of pharmaceutical sciences in Tartu. In 1985-1918, the department was led by prof. Ivan Kondakov, who is known by his works in chemistry, especially by his invention of synthetic rubber. He also had some publications in biochemistry and pharmaceutics. Beside the professor, private docents and educated pharmacists participated in teaching at the department. The duration of studies in the Department of Pharmacy was initially three terms but this was prolonged to four and six terms (three years) in 1896 and 1912, respectively. The programme of pharmacy, in 1852, consisted of 44% pharmaceutical sciences, 31% chemistry and 25% of other subjects. Lectures in pharmaceutical sciences were compulsory for both pharmacists and medical doctors. The very first pharmacy student started at the university already in 1807 and during 1815-1830 5-13 students were accepted annually. The largest number of pharmacy students were studying in Tartu in 1897, in the beginning of the 19th century it varied between 100-150. Several pharmacy students came from different parts of Russia. During the century shift, the number of Estonian students started to increase. This period, especially so called Dragendorff period can be considered to be a "golden era" of pharmacy education in Tartu.

III period: Pharmacy education in Estonian university starting from 1918.

Independence of Estonian Republic was announced on Feb. 24th 1918 but the War of Independence hampered continuation of teaching. Therefore, the opening session of Estonian university took place only on Dec. 1st 1919. However, teaching in the Department of Pharmacy started already on Oct. 6th 1919. A professorship in pharmacognosy and docentship in pharmaceutical chemistry were established. Johannes Stamm got the professorship as well as the position of the head of the Department of Pharmacy (1919-1921). Docentship was given to docent Henn Parts only in 1921. In the beginning, teaching was held in German and Russian which were gradually replaced by Estonian. In 1925, the department was divided into Chairs of Pharmacognosy (led by prof. J. Stamm until 1921) and Pharmaceutical Chemistry (led by prof. H. Parts until 1939). In 1936, the Chair of Pharmaceutical Chemistry was split into two and, thereby, the Chair of Applied Pharmacy (led by prof. Nikolai Veiderpass until 1940) was founded. This lasted until 1950 when the two last mentioned were merged again to form a Chair of Galenic Pharmacy and Pharmaceutical Chemistry (prof. N. Veiderpass 1944-1966). The Chair of Pharmacognosy was led by prof. Alma Tomingas (1944-1950). In 1966, one united Department of Pharmacy was formed, led by docent Boris Luik, followed by prof. Johannes Tammeorg, docent Ivar Tammaru and prof. Toivo Hinrikus. In 1990, this united department was split into two: departments of Pharmacognosy and Pharmaceutical Management, and Pharmaceutical Technology and Chemistry. After Estonia regained its independence, the Department of Pharmacy was reformed in 1993 (led by prof. Peep Veski at the present time).

In 1918, teaching was continued by the same two-years-programme as during the reign of the Russian Tsar. In 1921 and 1926, the time of study was prolonged to three and four years, respectively. The four-years-programme continued until the II World War and also during some years in Soviet Estonia. In 1948, the time of study was prolonged to 5 years and it has remained that way until today. In the beginning, experience from two years practicing in a pharmacy concluded with an exam, was a requirement to enter the university. In 1930, this requirement was abrogated and one could enter the university right after graduation from gymnasium. During the last decades, there have been entrance exams the student applicants have had to take. During the last couple of years, the acceptance to the university is based on results from state exams that pupils take to graduate from gymnasium. Most of the time, the graduation from the university has been based on results from appropriate exams. Before the Soviet time, two years internship in a pharmacy was required after the graduation. During the last years, exams have been replaced with diploma work (BSc), followed by 6 months internship. The latest changes have abrogated the internship, the graduation is based on the results of an exam and defence of the diploma work (diploma in pharmacy).

On December 1st 1939, there were 432 pharmacists with high education in Estonia. 40 from them left to Germany before the II World War. During 1919-1929, 99 persons graduated from the Department of Pharmacy, during 1929-1939 the number had increased to 257. During 1945-1955 there was 271

persons graduated, during 1956-1965 - 151, 1966-1975 - surprisingly 1202, and during 1976-1980 – 615 persons. After the war and until 1980, in total 3915 persons were graduated from the Department of Pharmacy. During the last two decades, there have been from 10-30 graduations annually. In nineties, the number of accepted students was decreased, today it has been restored to 30-40 persons per year.

The first building where the Department of Pharmacy was located in 1844 belonged to a pharmacist Köhler and it was situated in the city centre (known as a Stonebridge Pharmacy later on). In 1870, the department was moved into a university building (City Hall Square 6). In 1939, the department got its own building (Jakobi 2) where it was located until 2005. In fifties, another wing was built for Department of Chemistry, and today the whole building is officially called the Chemistry-building.

From 2005, the Department of Pharmacy is located in the modern Institute of Technology Building, Nooruse Str. 1, Tartu.

APPENDIX XVI. PHARMACY CURRICULUM, MASTER PROGRAMME, SINCE 2003

FIRST YEAR

SUBJECT I TERM Obligatory subjects		CP/ECTS	FORM ASSES	OF SMENT
MTMS.01.072 FKFE.00.004 FKKF.03.042 BGBO.01.007 ARAN.01.034 FLKE.02.125	Statistical Analysis General and Inorganic Chemistry Medical Physics 3/4.5 Botany Anatomy Latin in Medicine	2/3 4/6 3/4.5 3/4.5 2/3	Prelim	Prelim Exam Exam Exam Prelim
II TERM Obligatory subjects		17/25.5		
MTMS.01.072 ARMB.01.044 ARFS.01.063 BGBO.01.007 FLKE.02.125 FLFI.00.001 FKFE.00.004 ARFA.02.097 ARFA.01.069	Statistical Analysis Medical Microbiology Human Physiology Botany Latin in Medicine Introduction to Philosophy General and Inorganic Chemistry Pharmaceutical Terminology Introduction to Pharmacy and History of Pharmacy	2/3 2/3 4/6 3/4.5 2/3 2/3 1/1.5 1/1.5 1/1.5 1/1.5		Exam Prelim Exam Prelim Prelim Prelim Prelim

SECOND YEAR

SUBJECT I TERM Obligatory subjects		CP/ECTS	FORM OF ASSESSMENT
ARFS.01.063 FKOK.01.030 ARFA.02.072 ARMB.01.044 ARFA.02.073	Human Physiology Organic Chemistry I Pharmaceutical Analysis Medical Microbiology Professional Ethics	3/4.5 4/6 5/7.5 2.5/3.75 2/3 16.5/24.75	Exam Exam Exam Exam Prelim
II TERM – 16 WEEKS Obligatory subjects			
FKOK.01.046	Practical Works in Organic	3/4.5	Prelim
FKFE.05.053	Colloid Chemistry	3.5/5.25	Exam

ARMP.03.003	Pathological Physiology	3/4.5	Prelim
ARBK.01.002	Medical Biochemistry	2/3	Prelim
ARFA.02.074	Pharmaceutical Chemistry I	5/7,5	Exam
ARFA.02.077	Pharmaceutical Excipients	1.5/2.25	Exam
ARFA.02.077	Pharmaceutical Excipients	1.5/2.25	Exam

18/27

THIRD YEAR

SUBJECT I TERM Obligatory subjects		CP/ECTS FORM OF ASSESSMENT		
ARFA.02.075 ARFA.02.032 ARMP.03.003 ARBK.01.002 ARFA.01.057 ARFA.01.031	Pharmaceutical Chemistry II Pharmaceutical Technology Pathological Physiology Medical Biochemistry Pharmacognosy Cultivation of Medical Plants	3/4.5 3.5/5.25 2/3 2/3 5/7.5 2/3 17.5/26.25	Prelim Prelim Exam Exam Prelim	
II TERM – 16 WEEKS Obligatory subjects				
ARFA.02.032 ARFA.02.076 ARFA.01.045 ARFR.02.038 ARMP.01.030	Pharmaceutical Technology Pharmaceutical Chemistry III Phytochemistry Pharmacology Genetics	3.5/5.25 3/4.5 3/4.5 6/9 2/3 17.5/26.25	Exam Exam Exam Prelim Exam	

FOURTH YEAR

SUBJECT I TERM Obligatory subjects		CP/ECTS FORM OF ASSESSMENT		
ARFA.01.059	Pharmacoepidemiology and	2/3	Exam	
ARFR.02.038	Pharmacology	2.5/3.75	Exam	
ARMP.02.016	Immunology	1/1.5	Prelim	
ARFA01.058	Pharmaceutical Management	4/6	Exam	
ARFA.02.096	Galenical Pharmacy	3/4.5	Exam	
ARFA.02.079	Physicochemical Analysis of Drugs	3/4.5	Exam	
ARKI.01.004	First Aid	2/3	Prelim	
		17.5/26,25		

II TERM – 16 WEEKS

Obligatory subjects

ARFA.02.049	Biopharmaceutics	3/4.5	Exam
ARFR.02.017	Pharmacotherapy	2.5/3.75	Exam
ARFR.02.034	Toxicology of Drugs	1.5/2.25	Prelim
ARFA.01.044	Social Pharmacy	3/4.5	Exam
ARFS.01.062	Biotechnology	2/3	Prelim
ARFA.02.096	Galenical Pharmacy	3/4.5	Exam
MJJV.08.028	Basics of Creation and	2/3	Prelim
	Development of Enterprise		

17/25,5

FIFTH YEAR

SUBJECT TERM – 40 WEEKS Obligatory subjects		CP/ECTS FORM ASSESSMEN	OF T
ARFA.02.071 ARFA.02.044 ARFA.02.040 ARFA.01.038 ARFA.01.039 ARFA.01.040 ARFA.01.041 ARFA.02.041 ARFA.02.042	Pharmacy Practice Pharmaceutical Commodities Designing of Research Work Research Seminar Research Seminar in Social Pharmacy Research Seminar in Pharmaceutical Management Research Seminar in Phytochemistry Research Seminar in Pharmacognosy Research Seminar in Biopharmaceutics Research Seminar in Pharmaceutical Technology Research Seminar in Pharmaceutical	25/37.5 3/4.5 0.5/0.75 2/3	Prelim Prelim Prelim
ARFA.02.043	Chemistry		
ARFA.02.101	Research Seminar in History of Pharmacy Research Work	7.5/11.25	Public defence
ARFA. 02.060	Final Exam	2/3	
	40/ 60		
Elective subjects		13/19.5	Prelims
Free subjects		8/12	Prelims

APPENDIX XVII. PHARMACY CURRICULUM, MASTER PROGRAMME SINCE 2007

Compulsory subjects

First year

l term

	SUBJECT	CP/ECTS	FORM OF ASSESSMENT
MTMS.01.085	Statistical Analysis	3/4.5	Prelim
ARAN.01.034	Anatomy	3/4.5	Exam
ARFA.01.071	Introduction to Pharmacy and History of Pharmacy	2/3	Prelim
LOKT.00.004	General and Inorganic Chemistry	4/6	Exam
ARFS.01.023	Biophysics	3/4.5	Exam
FLKE.02.199	Latin in Pharmacy	2/3	Prelim
		17/25.5	

II term

		17/25.5	
ARFA.02.098	Pharmaceutical Terminology	2/3	Prelim
ARFA.02.099	Analytical Chemistry	5/7.5	Exam
ARFA.01.072	Pharmacognosy I	2/3	Prelim
ARMB.00.001	Medical Microbiology	4/6	Exam
ARFS.01.063	Human Physiology	4/6	Exam

Second year

l term

	SUBJECT	CP/ECTS	FORM OF ASSESSMENT
ARBK.01.042	Bioorganic Chemistry	3/4.5	Exam
ARBK.01.043	Medical Biochemistry	3/4.5	Exam
ARFS.01.063	Human Physiology	3/4.5	Exam
ARFA.02.099	Analytical Chemistry	2/3	Exam
ARMB.01.053	Clinical Microbiology	1/1.5	Prelim
ARFA.02.103	Pharmaceutical Excipients	3/4.5	Exam

15/22.5

II term

		18/27	
ARFA.02.109	Pharmaceutical Chemistry I	6/9	Exam
ARFA.02.018	Bioethics	3/4.5	Prelim
ARMP.01.030	Genetics	2/3	Exam
ARPO.00.020	Primary Care Medicine	3/4.5	Exam
ARMP.03.031	Pathological Physiology	4/6	Exam

Third year

I term

	SUBJECT		CP/ECTS	FORM OF ASSESSMENT
	Pharmacognosy II		6/9	Exam
	Pharmaceutical Technology		6/9	Exam
	Pharmaceutical Chemistry II		5/7.5	Exam
	Introduction to Laboratory Medicine		1.5/2.25	Prelim
			18.5/27.75	
II term				
	Pharmaceutical Technology		6/9	Exam
	Pharmacognosy III		3/4.5	Exam
	Phamacology		7/10.5	Exam
	Drug Toxicology	2/3	Prelim	
			18/27	
Fourth year				
I term				
	SUBJECT		CP/ECTS	FORM OF ASSESSMENT
	Galenical Pharmacy		5/7.5	Exam

4/6

Exam

Physical Pharmacy

		18/27	
	Drug Metabolism	2/3	Prelim
	First Aid	2/3	Prelim
	Pharmacoeconomy and Pharmacoepidemiology	2/3	Exam
	Pharmaceutical Management	3/4.5	Exam
	Social Pharmacy	4/6	Exam
	Biopharmaceutics	5/7.5	Exam
II term			
		18/27	
	Clinical Pharmacology	1.5/2.25	Prelim
	Pharmacotherapy	3/4.5	Exam
	Immunology	1.5/2.25	Prelim
	Biotechnology	3/4.5	Exam

Fifth year

SUBJECT	CP/ECTS	FORM OF ASSESSMENT
Pharmacy Practice	25/37.5	Prelim
Pharmaceutical Commodities	3/4.5	Prelim
Designing of Research Work	0.5/0.75	Prelim
Research Seminar	5/7.5	Prelim
Research Seminar on Social Pharmacy		
Research Seminar on Pharmaceutical Management		
Research Seminar on Pharmacognosy		
Research Seminar on Biopharmaceutics	6	
Research Seminar on Pharmaceutical Technology		
Research Seminar on Pharmaceutical Chemistry		
Research Seminar on History of Pharma	асу	
Defence of Research Work	4.5/6.75	

Final Exam

2/3

40/60

COMPULSORY SUBJECTS ELECTIVE SUBJECTS

OPTIONAL SUBJECTS

179.5 CP/269.25 ECTS

12.5 CP/18.75 ECTS

8 CP/12 ECTS

APPENDIX XVIII. COMPULSARY SUBJECTS TAUGHT IN THE DEPARTMENT OF PHARMACY

COURSE OUTLINE

1. Identification

Name of Department: Department of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian:			Subject Code:
Pharmaceutical terminology			ARFA.02.098
Farmaatsiaterminoloogia			
National Credits (CP):	ECTS Credits (CP)):	
2	3		
Study Level (Name of Curriculum):		Location in	Curriculum
Pharmacy		(semesters	<i>):</i>
		II	

2. Brief Description

Objectives and Outcomes of the Course: The aim of pharmaceutical terminology is to introduce pharmacy students to the terms of different subjects of pharmacy

Brief Description of the Course (Annotation): Use of the most important pharmaceutical terms are learned.

Languages of Teaching: Estonian

Study Period (in weeks): 12 weeks

Lecturers:

Toivo Hinrikus, Peep Veski, Ain Raal

Course Web Page:

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures, independent work

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

4. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix. European Pharmacopoeia, 5th Edition, volume 1,2. 2005. Council of Europe, Strasbourg. European Pharmacopoeia, 6th Edition, volume 1,2. 2007. Council of Europe, Strasbourg. Standard Terms, 5th Edition. Pharmaceutical dosage forms. Routes of administration. Containers. December 2004. Council of Europe, Strasbourg. Eesti keele sõnaraamat. ÕS 1999. Eesti Keele Sihtasutus, Tallinn, 1999.

Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment

5. Assessment

Way of Final Assessment

- ⊠ Continuous assessment
- Practical work or bedside evaluation
- Written (test)
- 🛛 Oral

Composition of the Final Assessment (grade)

Final assessment: short essay questions, in total 30 points, preliminary examination result is graded according

to the university general rules. Prerequisites to complete the course and to participate in preliminary

examination: participation in all lectures.

Programme

Loolaioo	-	
Week	Торіс	Lecturer
1.	Terminology. Pharmaceutical terminology (definitions,	T. Hinrikus
	development, use, types).	
2.	Development of medicinal terminology in Estonia. Development	T. Hinrikus
	of terminology of chemistry in Estonia.	
3.	Development of pharmaceutical terminology in Estonia.	T. Hinrikus
4.	Classification of medical substances – standard terms.	T. Hinrikus
5.	Classification(s) of dosage forms. Classification of excipients	P. Veski
	- standard terms.	
6.	Standard terms of dosage forms.	P. Veski
7.	Administration routes of dosage forms – standard terms.	P. Veski
8.	Administration routes of dosage forms - standard terms.	P.Veski
	Containers – standard terms.	
9.	History of basic terminology of pharmacy in the world.	A. Raal
10.	Symbolism and pharmacy terminology.	A. Raal
11.	Standard terms of pharmacognosy.	A. Raal
12.	Standard terms of pharmacognosy.	A. Raal

Subtotal hours 40

TOTAL HOURS 40

COURSE OUTLINE

1. Identification

Name of Department: Institute of Pharmacy			Code of Department: ARFA
Course Title in English and Estonian:			Subject Code: ARFA 01 071
erialasse ja farmaatsia ajalugu			
National Credits (CP): ECTS Credits (CP):):	
2	3		
Study Level (Name of Curriculum):		Location in	Curriculum
Pharmacy		(semesters I):

2. Brief Description

 Objectives and Outcomes of the Course:

 The main aim of the course is to obtain knowledge about peculiarity of pharmacy education, the system and institutions of pharmacy, ethics of speciality, as well as about the basic periods of the history of pharmacy.

 Brief Description of the Course (Annotation):

 Introduction to the pharmacy and the history of pharmacy is the basic subject for the students who just started their pharmacy studies. The peculiarity of pharmacy education in the world and in Europe, as well as it's individuality and history in Estonia, are discussed. During this particular course also the following points will be studeid: ministry of social affairs, state agency on medicines, retail pharmacies, hospital pharmacies, wholsalers, foreign pharmacy companies and manufacturing of

medicines in Estonia; also the ethics of speciality. Introduced the basic periods and persons of the history of pharmacy, such as the pharmacy in ancient China, India, Greek and Rome, Arabian countries, middel age Europe, alchemistry, iatrochemistry, theory of flogiston, homeopathy, the beginning of phytochemistry, etc.

Languages of Teaching: Estonian

Study Period (in weeks): 16

Lecturers:

Basically A. Raal, also P. Veski, D. Volmer and M. Paavo

Course Web Page: It is available from Intranet

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) 32 hours of lectures, 9 hours of seminars, 39 hours of independent work

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

5.Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.

1. T	extbooks in Estonian	available from Intrar	et (https://www.is.ut.	ee/pls/ois/!tere.tulemast)
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- 2. Ain Raal. Tervist ja vürtsi maailma maitsetaimedest. Tallinn, Valgus, 2005 [in Estonian]
- 3. Ain Raal. Teekond taimede taha. Tartu, Elmatar, 2008 [in Estonian]
- 4. Hinrikus, T., Raal, A., Tankler, H. Farmaatsia Tartu ülikoolis läbi aegade. Tartu, 2005 [in Estonian]
- 5. Raal, A., Hinrikus, T., Tankler, H. Pharmacy at the University of Tartu. Tartu, 2006.

Available teaching Resources

- ☐ Teaching materials for lecture / classroom demonstration
- ☐ Teaching / learning materials to be distributed among students
- ☐ Teaching / learning materials in Internet

5. Assessment

Way of Final Assessment

🖾 🗌 Continuous assessment

- ⊠ □ Written (test)
- 🛛 🗌 Oral

Composition of the Final Assessment (grade)

Final assessment: two term papers and written preliminary exam, multiple choice questions (30 points). Exam result is graded according to the Study Regulations of University of Tartu: E to A is regarded as pass and F is regarded as failure.

Programme

Lectures

Week	Торіс	Lecturer
1.	Pharmacy education in Europe and in Estonia	P. Veski
2.	Pharmacy system in Estonia	D. Volmer
3.	Pharmacy ethics	M. Paavo
4.	The university as academic institution	A. Raal
5.	History of the University of Tartu	A. Raal
6.	Pharmacy at the University of Tartu	A. Raal
7.	Medicine and pharmacy BC and in Ancient Egypt	A. Raal
8.	Medicine and pharmacy in Ancient Greece	A. Raal
9.	Medicine and pharmacy in Ancient Rome	A. Raal
10.	Medicine and pharmacy in Arabia. Pharmacy and Middle Ages in	A. Raal
	Europe	
11.	Pharmacy in China and India: Chinese herbal medicine,	A. Raal
	ayurvedic medicine and pharmacy	
12.	Alchemistry and iatrochemistry	A. Raal
13.	Homeopathy	A. Raal
14.	The theory of Flogiston. The phytochemical age (beginning of	A. Raal
	XIX Century).	
15.	Pharmacy in Russia	A. Raal
16.	Pharmacy in Estonia in 1918-1940 and later	A. Raal

Subtotal hours 32

Seminars

Week	Торіс	Teacher
1.	The history of pharmacy (the oldest period)	A. Raal
2.	The history of pharmacy (Middle ages)	A. Raal
3.	The history of pharmacy (XIX and XX Century)	A. Raal

TOTAL HOURS 41

COURSE OUTLINE

1. Identification

Name of Department. Institute of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian: Pharmaceutical chemistry I		Subject Code: ARFA.02.074	
National Credits (CP): 5	ECTS Credits (CP) 7.5):	
<i>Study Level (Name of Curriculum):</i> Pharmacy		Location in (semesters 4	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: Introduction of pharmacy students to the synthesis, properties, identification and assay of active pharmaceutical ingredients of inorganic and organic origin. After passing this course a pharmacy student should be able to use European Pharmacopoeia efficiently and propose methods of analysis on the assumption of chemical structure of the substance of interest.

Brief Description of the Course (Annotation):

Pharmacy students learn the methods of quality control of medicines, e.g. subjects like clarity and degree of coloration of liquids, limit tests for impurities and analysis of purified water are dealt with. The introduction to inorganic and organic active pharmaceutical ingredients starts, focusing on synthesis/production, properties and methods of qualitative and quantitative analysis. Substances are grouped by their chemical properties. The preparations containing inorganic halogens, oxygen, nitrogen, carbon, magnesium, calcium, zinc, iron are covered as well as derivatives of following groups of organic compounds: saturated hydrocarbons, aldehydes, carboxylic acids, alcohols, ethers, esters, amino acids, aromatic compounds.

Languages of Teaching: Estonian

Study Period (in weeks): 16

Lecturers: Andres Meos, Elmar Arak

Course Web Page: http://www.ut.ee/ARFA/OPPMAT.HTM

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures 56 hours, practicals 64 hours

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

6.Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and

available at the institute's library are given in the separate appendix.

A. Meos. Anorgaanilised raviained. Farmatseutilse keemia loengukursus, 2. trükk. Tartu 2006.
A. Meos. Orgaanilised raviained, 1. osa. Farmatseutilise keemia loengukursus. 2. trükk. Tartu 2006.
E. Arak, A. Meos. Abimaterjale farmatseutilise analüüsi ja farmatseutilise keemia laboratoorseteks töödeks. Tartu 2006.

D. Cairns. Essentials of Pharmaceutical Chemistry. 2nd Edition. Pharmaceutical Press, 2003. В.Г. Беликов. Фармацевтическая химия. Москва, Высшая школа, 1985.

Available teaching Resources

- I Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation
- Written (test)

Written (essay)

- 🛛 Oral
- Combination
- Other
- □ None

Composition of the Final Assesment (grade)

Qualification to the final assessment: completing of all practicals and written tests. Final assessment: graded written exam, questions consist of 10 calculations and of 70 questions (both multiple choice and short essay). One calculation or question is worth one point, minimum number of points for passing the examination is 41 (~51%).

Programme Lectures

Week	Торіс	Lecturer
1.	Introduction to pharmaceutical chemistry, general methods of synthesis, identification, purity tests and analysis of active pharmaceutical ingredients, introduction to European	E. Arak
	Pharmacopoela	
2	European Pharmacopoeia: general terminology, general tests	E. Arak
	and assays, structure of pharmacopoeia monograph. Halogens	
3.	Halogenides, purified water	E. Arak
4.	Oxygen and its compounds	E. Arak
5.	Sulfur and its compounds, nitrogen and its compounds	E. Arak
6.	Compounds of bismuth, salts of alkali metals (Na, Li),	E. Arak

	compounds of silicon, magnesium and boron	
7.	Compounds of calcium, zinc and barium	E. Arak
8.	Compounds of mercury, iron and silver	E. Arak
9.	Saturated hydrocarbons and halogen derivatives of saturated hydrocarbons. Aldehydes	A. Meos
10.	Aliphatic carboxylic acids and their salts. Derivatives of EDTA. Alcohols	A. Meos
11.	Esters of nitric acid, ethers, aryl aliphatic esters	A. Meos
12.	Aliphatic amino acids. Phenols. Aromatic carboxylic acids and their salts and esters	A. Meos
13.	Derivatives of para-aminophenol, dialkylaminoderivatives of acetanilide	A. Meos
14.	Derivatives of para-aminobenzoic acid and para-aminosalicylic acid	A. Meos
15.	Chloroderivatives of aromatic sulfonic acid. Alkylureides of aromatic sulfonic acid	A. Meos
16.	Sulphonamides	A. Meos

Practicals

Week	Торіс	Teacher
1.	Determination of clarity and opalescence of liquids, coloration of liquids	A. Meos, E. Arak, TM.
2	Limit tests for ammonium, coloium, iron, hoovy, motolo, chloridoo	Tammaru
2	and sulfates	A. Meos, E. Arak, TM. Tammaru
3.	Determination of melting range or melting temperature	A. Meos, E. Arak, TM. Tammaru
4.	Quality control of purified water	A. Meos, E. Arak, TM. Tammaru
5.	Refractometry	A. Meos, E. Arak, TM. Tammaru
6.	Identification and assay of peroxides (hydrogen peroxide, magnesium peroxide)	A. Meos, E. Arak, TM. Tammaru
7.	Synthesis of acetylsalicylic acid. Written test	A. Meos, E. Arak, TM. Tammaru
8.	Identification and assay of amino acids (glutamic acid, methionine)	A. Meos, E. Arak, TM. Tammaru
9.	Identification and assay of aliphatic carboxylic acids and salts (tartaric acid, sodium citrate)	A. Meos, E. Arak, TM. Tammaru
10.	Purity tests and assay of synthesized acetylsalicylic acid.	A. Meos, E. Arak, TM. Tammaru
11.	Identification and assay of aldehydes (formaldehyde, chloral hydrate, methenamine)	A. Meos, E. Arak, TM. Tammaru
12.	Identification and assay of phenols (phenol, resorcinol, thymol)	A. Meos, E. Arak, TM. Tammaru

13.	Identification and assay of aromatic carboxylic acids and salts (benzoic acid, salicylic acid, sodium benzoate, sodium salicylate). Written test	A. Meos, E. Arak, TM. Tammaru
14.	Identification and assay of derivatives of para-aminobenzoic acid (benzocaine, procaine, procainamide, tetracaine)	A. Meos, E. Arak, TM. Tammaru
15.	Practical test	A. Meos, E. Arak, TM. Tammaru
16.	Workshop	A. Meos, E. Arak, TM. Tammaru

TOTAL HOURS 120 + 80 independent work = 200

COURSE OUTLINE

1. Identification

Name of Department. Department of Pharmacy			Code of Department. ARFA
<i>Course Title in English and Estonian</i> : Pharmaceutical Excipients Farmatseutilised abiained			Subject Code: ARFA.02.103
National Credits (CP): 3	ECTS Credits (CP): 4.5	:	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters) 3. semester	Curriculum): r

2. Brief Description

Objectives and Outcomes of the Course:

The aim of present course is to describe the correlations between the physical, chemical and functionality properties of excipients and biopharmaceutical characteristics and formulative properties of pharmaceutical formulations.

Brief Description of the Course (Annotation):

The biopharmaceutical properties of the final dosage form are highly dependent on the excipients chosen, no longer can excipients be regarded simply as inert or inactive ingredients, and a detailed knowledge not only physical and chemical properties but also of the safety, functionality and regulatory status of the excipients is essential for formulators.

Languages of Teaching: Estonian

Study Period (in weeks): 16 weeks

Lecturers:

Professor Peep Veski

Course Web Page:

http://www.med.ut.ee/farmaatsia

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) 48 h of lectures, 12 h of seminars, 60 h of independent work

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

7.Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.
1. R.C. Rowe, P.J. Sheskey, P.J. Weller. Handbook of Pharmaceutical Excipients. IV Edition, 2003.
2. M.E. Aulton. Pharmaceutics, the science of dosage design. 2002.
3. G.S. Banner, C.T. Rhodes. Modern pharmaceutics. 1996.
4. European Pharmacopoeia 6.

Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet

5. Assessment

Way of Final Assessment

Ì	Continuous	~~~~~~~
	Continuous	assessment

- Practical work or bedside evaluation
- Written (test)
- Written (essay)
- 🛛 Oral

Other

None

Composition of the Final Assessment (grade)

Final Assessment in written form – definitions, essay questions, problem solving cases and multiple choice test

Programme Lectures

Week	Торіс	Lecturer
1.	Introduction. Literature. Functionality of excipients. Functionality related characteristics. Design space.	P. Veski
2.	Classification of excipients. Classification of dosage forms. Standard terms.	P. Veski
3.	Solvents as excipients: water(s), ethanol, herbal oils. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P. Veski
4.	Solvents as excipients: glycerol, polyethylene glycol, propylene glycol, light mineral oil, DMSO. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P. Veski
5.	Excipients in suspensions. Suspending excipients: acacia, carrageenan(s), tragacanth, xanthan gum, guar gum. Bentonite. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P Veski
6.	Wetting agents in dispersions: polysorbates, sorbitan esters, sodium lauryl sulphate, polyethylene alkyl ethers. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P. Veski
7.	Classification of surfactants. HLB-value. Anionic surfactants: alkali metal and ammonium soaps, soaps with divalent and trivalent metals, amine soaps, sulphated and sulphonated compounds. Chemical and physical properties. Functionality.	P. Veski

	Application in pharmaceutical formulations. Quality	
	requirements. Stability.	
8.	Cationic surfactants. Non-ionic surfactants. Amphoteric surfactants. Polysaccharides and semisynthetic polysaccharides as emulsifying agents. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P. Veski
9.	Suppository bases: Macrogols, hard fat, Oleum cacao. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P. Veski
10.	Excipients in solid dosage forms (tablets, hard capsules). Classification of excipients: technological and biopharmaceutical excipients. Gelatin. Diluents: cellulose, microcrystalline cellulose, lactose, maltose, starches. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P. Veski
11.	Diluents: mannitol, sorbitol, cucrose, sugar spheres, dextrin, dextrates, dextrose, calcium phosphates. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P. Veski
12.	Binding agents: cellulose derivatives, povidone, carbomers, poloxamers. Lubricants: stearic acid, magnesium stearate, glyceryl behenate, sodium stearyl fumarate. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability	P. Veski
13.	Glidants: silicon dioxide, colloidal silicon dioxide, talc. Disintegrants. Mechanisms of disintegration. Crospovidone. Sodium starch glycolate. NaCMC. Excipients in direct compression of tablets. Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P.Veski
14.	Coating agents: film-forming agents, controlled-release agents. Cellulose derivatives. Methacrylate amino ester copolymers. Aqueous polymer dispersions. Plasticizers Chemical and physical properties. Functionality. Application in pharmaceutical formulations. Quality requirements. Stability.	P. Veski
15.	Dendrimers, thiomers, chitosan, sodium alginate	P. Veski
16.	Excipients in macromolecular systems: hydrogels, hybrid hydrogels, polyelectrolyte hydrogels	P. Veski

Subtotal hours ...48.....

Seminars

Week	Торіс	Teacher
1.	Concrete pharmaceutical formulations – solutions and	P. Veski
	dispersions. Characterisation of excipients. Functionality of	
	excipients. Functionality related characteristics of excipients.	
2.	Concrete pharmaceutical formulations – semisolid dosage	P. Veski
	forms. Characterisation of excipients. Functionality of excipients.	
	Functionality related characteristics of excipients.	
3.	Concrete pharmaceutical formulations – solid dosage forms.	P. Veski
	Characterisation of excipients. Functionality of excipients.	
	Functionality related characteristics of excipients.	
4.	Concrete pharmaceutical formulations – solid dosage forms.	P. Veski
	Characterisation of excipients. Functionality of excipients.	
	Functionality related characteristics of excipients.	

Subtotal hours ...12.....

TOTAL HOURS60.....

COURSE OUTLINE

1. Identification

Name of Department: Department of Pharmacy			Code of Department: ARFA
Course Title in English and Estonian: Pharmaceutical Chemistry II Farmatseutiline keemia II			Subject Code: ARFA 02.075
National Credits (CP): 3	ECTS Credits (CP) 4,5):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters V	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: The aim of pharmaceutical chemistry is to introduce pharmacy students to the chemical origin and to the methods of qualitative and quantitative analysis of medical substances.

Brief Description of the Course (Annotation): Analysis of the most important medical substances and the theoretical basis are learned.

Languages of Teaching: Estonian

Study Period (in weeks): 16 weeks

Lecturers: Toivo Hinrikus

Course Web Page:

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures, practicals, independent work

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

8. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix. European Pharmacopoeia, 5th Edition, Volume 1,2. 2005. Council of Europe, Strasbourg. European Pharmacopoeia, 6th Edition, Volume 1,2. 2008. Council of Europe, Strasbourg. Belikov V.G. Farmatsevtischeskaja chimija. 4th Edition. 2007, Moskva: MEDpress-inform. Gosudarstvennaja farmakopeja SSSR. 1968, Moskva: Meditsina. Eger, K., Troschütz, R., Roth, H. J. Arzneistoffanalyse. Reaktivität. Stabilität. Analytik Deutscher Apotheker Verlag, Stuttgart, 1999. Hinrikus, T. Raviained alkaloididest: omadused ja analüüsimine. 2006, Tartu, Tartu Ülikool.

Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation
- Written (test)
- 🛛 Oral

Composition of the Final Assessment (grade)

Final assessment: short essay questions and multiple choice test, in total 30 points, exam result is graded

according to the university general rules from F (insufficient, not passed) to A (excellent). Prerequisites to

complete the course and to participate in the exam: written intermediate tests passed, participation in all

practicals.

Programme

Week	Торіс	Lecturer
1.	Heterocyclic compounds. Derivatives of nitrofurane. Derivatives	T. Hinrikus
	of pyrazolone.	
2.	Derivatives of 4-pyridincarbocylic acid. Derivatives of	T. Hinrikus
	acridine.	
3.	Derivatives of pyrimidin-2,4,6-trione.	T. Hinrikus
4.	Derivatives of pyrimidin-4,6-dione.	T. Hinrikus
5.	Derivatives of benzodiazepine.	T. Hinrikus
6.	Urethanes.	T. Hinrikus
7.	Terpenoides. Polarimetry.	T. Hinrikus
8.	Carbohydrates.	T. Hinrikus
9.	Carbohydrates.	T. Hinrikus
10.	Derivatives of quinoline alkaloids.	T. Hinrikus
11.	Derivatives of isoquinoline alkaloids.	T. Hinrikus
12.	Derivatives of 1-benzylisoquinoline alkaloids.	T. Hinrikus
13.	Derivatives of purinic alkaloids.	T. Hinrikus

14.	Derivatives of tropinic alkaloids.	T. Hinrikus
15.	Derivatives of indolic alkaloids.	T. Hinrikus
16.	Acyclic alkaloids.	T. Hinrikus

Laboratory work

Week	Торіс	Teacher
1.	Identification and assay of sulfonylureas.	T. Hinrikus
2.	Identification and assay of sulfanilamides.	T. Hinrikus
3.	Identification and assay of derivatives of pyrazolone.	T. Hinrikus
4.	Identification and assay of derivatives of pyridincarbocylic acid.	T. Hinrikus
5.	Identification and assay of barbiturates. Test.	T. Hinrikus
6.	Full analysis of medical substances (inorganic).	T. Hinrikus
7.	Full analysis of medical substance (organic).	T. Hinrikus
8.	Full analysis of medical substance (organic).	T. Hinrikus
9.	Full analysis of medical substance (organic).	T. Hinrikus
10.	Identification and assay of derivatives of quinoline.	T. Hinrikus
11.	Identification and assay of derivatives of phenanthreniso- quinoline. Test.	T. Hinrikus
12.	Identification and assay of purinic alkaloids.	T. Hinrikus
13.	Identification and assay of tropinic alkaloids.	T. Hinrikus
14.	Identification and assay of indolic alkaloids.	T. Hinrikus
15.	Identification and assay of acyclic alkaloids. Test.	T. Hinrikus
16.	Workshop.	T. Hinrikus

Subtotal hours 40

TOTAL HOURS 72

COURSE OUTLINE

1. Identification

Name of Department: Department of Pharmacy			Code of Department. ARFA
<i>Course Title in English and Estonian</i> : Pharmaceutical Technology – Farmatseutiline tehnoloogia			Subject Code: ARFA.02.032
National Credits (CP): 7	ECTS Credits (CP, 10.5):	
Study Level (Name of Curriculum):Location in CurriculumPharmacy(semesters):5,6		Curriculum):	

2. Brief Description

Objectives and Outcomes of the Course:

The aim of present course is to describe the scientific and technological aspects of the design and manufacture of dosage forms.

Brief Description of the Course (Annotation):

The aim of present course is to describe the scientific and technological aspects of the design and manufacture of dosage forms. This course describes properties of different substances and dosage forms, preparation of pharmaceutical dosage forms and drug delivery systems. The purpose of this course is also to introduce manufacturing processes like powdering, granulation, drying, tabletting, dissolution, solubilization etc on both a small and a large scale.

Languages of Teaching: Estonian

Study Period (in weeks): 32

Lecturers:

Peep Veski, Urve Paaver, Piret Kreutzwald

Course Web Page: Not available. http://www.med.ut.ee/307959

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures 64 hours, practicals 96 hours, seminars 8 hours, independent work 112 hours

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

9. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.

1. M. E. Aulton Pharmaceutics. The science of dosage form design. - 2nd ed. Churchill-Livingstone, 2002

- A. T. Florence and D. Attwood Physicochemical Principles of Pharmacy. 3rd ed. Pharmaceutical Press, 2004.
- 3. L. V. Allen Jr., N. G. Popovich, H. C. Ansel Ansel's pharmaceutical dosage forms and drug delivery systems. Lippincott Williams & Wilkins, 2005.
- 4. Handbook of pharmaceutical excipients. 4th ed. / edited by R. C. Rowe, P. J. Sheskey, P. J. Weller. Pharmaceutical Press, 2003.
- 5. D. M. Collett, M. E. Aulton. Pharmaceutical Practice. 1996.
- 6. European Pharmacopoeia, 6th Edition, 2007.

Available teaching Resources

Teaching materials for lecture / classroom demonstration

- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment

\boxtimes	Continuous	assessment
	00111110000	000000000000000000000000000000000000000

Practical work or bedside evaluation

- Written (test)
- Written (essay)
- Oral

Combination

Other

None

Composition of the Final Assessment (grade)

Qualification to the final assessment: doing all practical works + positive results on 5 practical and theoretical colloquium

Final assessment: written exam - multiple choice questions + short essay questions + definitions.

Programme

Lectures

Week	Торіс	Lecturer
1.	Introduction. What is the pharmaceutical technology? Basic	P.Veski
	concepts. Drugs. Dosage Forms. Drug Delivery Systems.	
2.	Classification of dosage forms. EP. Principles.	P.Veski
3.	Classification of dosage forms.	P.Veski
4.	Routes of administration of dosage forms. Preparation for oral use. Oromucosal preparations. Parenteral preparations.	P.Kreutzwald
	Preparations for topical use. Advantages and disadvantages.	
5.	Routes of administration of dosage forms. Eye, ear, nasal, vaginal and rectal preparations. Advantages and disadvantages. Prescriptions. Prescribing drugs. Abbreviations on prescriptions.	P.Kreutzwald
6.	Powders. Powders as dosage forms. Containers for powders. Particle size. Particle size analysis methods.	P.Veski

7.	Powders. Particle-size reduction.	P.Veski
8.	Powders. Particle-size separation. Mixing principles. Perfect mixes. Random mixes.	P.Veski
9.	Powders. Mixing of powders. Ordered mixes. The EP quality criteria for powders.	P.Veski
10.	Solutions. Solubility. Expressions of concentration. The process of dissolution. Energy changes. Dissolution mechanisms. Choice of solvent. Water. Non-aqueous solutions.	P.Kreutzwald
11.	Dissolution. Rate of dissolution. The factors affecting to the dissolution rates. Factors affecting the solubility of solids in liquids. pH and pKa.	P.Kreutzwald
12.	Solutions. Molecular structure of solute. The excipients in solutions. Cosolvents.	P.Veski
13.	Solutions. The excipients in solutions.	P.Veski
14.	The quality criteria for solutions. Methods of determination.	P.Kreutzwald
15.	Disperse systems. Colloids. Properties of colloids.	P.Veski
16.	Properties of disperse systems. Stability of colloidal systems. High molecular solutions.	P.Veski

Lectures

Week	Торіс	Lecturer
1.	Coarse disperse systems. Suspensions. Emulsions. Place in EP classification. Advantages and disadvantages. The EP quality criteria for suspensions.	U.Paaver
2.	Suspensions. Electrical properties of interfaces. Flocculated and deflocculated systems. Controlled flocculation. Flocculating agents. Steric stabilisation of suspensions. Excipients in suspensions.	U.Paaver
3.	Rheological properties of suspension. Viscosity modifiers.	U.Paaver
4.	Emulsions. Emulsion type. Formulation of emulsions. Theory of emulsion stabilization. Stability of emulsions.	U.Paaver
5.	Surfactants. Hydrophile-lipophile balance (HLB). Calculating HLB value. Required HLB value. Disadvantages HLB system.	U.Paaver
6.	Classification of emulsifying agents. Synthetic and semisynthetic surface-active agents. Cationic. Anionic. Non-ionic. Amphoteric.	U.Paaver
7.	Emulsifying agents. Naturally occurring materials and their derivates. Finely divided solids. Other formulation additives. Preservation of suspensions and emulsions. Manufacture of suspensions and emulsions.	U.Paaver
8.	Solubilization. Micelles. Micellaneous solubilization. Foams. Foam breakers. Foam inhibitors.	U.Paaver
9.	Semi-solid preparations. Ointments. Creams. Pastes. Criteria for preparations applied to skin.	P.Kreutzwald
10.	Skin. Bioavailability of drugs applied to skin.	P.Kreutzwald
11.	Pharmaceutical excipients using in semi-solid preparations. Hydrocarbon bases. Fats and fixed-oil bases. Silicones. Absorption bases. Emulsifying bases. Water-soluble bases.	P.Kreutzwald
12.	The other excipients using in semi-solid preparations. Emollients. Enhancers. Etc.	P.Kreutzwald
13.	Gels.	P.Veski
14.	Transdermal Therapeutic Systems. Monolith or matrix system. Rate-limiting membrane system. Clinical patches. Transdermal Scop. etc.	U.Paaver
15.	Rectal preparations.	P.Kreutzwald
16.	Vaginal preparations	P.Kreutzwald

Seminars

Week	Торіс	Teacher
1.	Topic of discussion: classification of dosage forms, properties of solid state, powders as dosage form	P. Veski
2.	Topic of discussion: liquid dosage forms, semisolid dosage forms	P. Kreutzwald
3.	Topic of discussion: dispersions	U. Paaver
4.	Topic of discussion: rectal and vaginal formulations	P. Kreutzwald

Subtotal hours 8

Laboratory work

Week	Торіс	Teacher
1.	Characteristics of prescriptions	M.Paavo
2.	Preparation of powders	M.Paavo
3.	Preparation of powders	M.Paavo
4.	Preparation of powders	M.Paavo
5.	Practical and theoretical colloquium on preparation of powdered dosage forms	M.Paavo
6.	Preparation of solutions	M.Paavo
7.	Preparation of solutions, high molecular solutions and colloidal dispersions	M.Paavo
8.	Preparation of different types of solutions	M.Paavo
9.	Preparation of different types of solutions	M.Paavo
10.	Practical and theoretical colloquium on preparation of solutions	M.Paavo
11.	Preparation and analysis of solutions and syrups.	M.Paavo
12.	Preparation and analysis of solutions and syrups.	M.Paavo
13.	Preparation of aromatic waters	M.Paavo
14.	Practical and theoretical colloquium on the fall term study materials	M.Paavo
15.	Preparation of different dosage forms	M.Paavo
16.	Completing of practical works	M.Paavo

Subtotal hours 48

Laboratory work

Week	Торіс	Teacher
1.	Preparation of suspensions and emulsions	M.Paavo
2.	Preparation of suspensions and emulsions	M.Paavo
3.	Preparation of suspensions and emulsions	M.Paavo
4.	Preparation of suspensions and emulsions	M.Paavo
5.	Preparation of suspensions and emulsions	M.Paavo
6.	Practical and theoretical colloquium on suspensions and	M.Paavo
	emulsions	
7.	Preparation of ointments, creams, pastes, gels	M.Paavo
8.	Preparation of ointments, creams, pastes, gels	M.Paavo
9.	Preparation of rectal and vaginal drugs (suppositories)	M.Paavo
10.	Preparation of rectal and vaginal drugs (suppositories)	M.Paavo
11.	Preparation of rectal and vaginal drugs (suppositories)	M.Paavo
12.	Preparation of different dosage forms	M.Paavo

13.	Preparation of different dosage forms	M.Paavo
14.	Preparation of different dosage forms	M.Paavo
15.	Practical and theoretical colloquium on fall and spring term on study materials	M.Paavo
16.	Completing of practical works	M.Paavo

TOTAL HOURS 168

ARFA.01.057 Course Outline

1. Identification

Name of Department. Institute of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian:			Subject Code:
Pharmacognosy/Farmakognoosia			ARFA.01.057
National Credits (CP): ECTS Credits (CP)):	
5	7.5		
Study Level (Name of Curriculum):		Location in Curriculum	
Pharmacy		(semesters) V):

2. Brief Description

Objectives and Outcomes of the Course: The main aim of the course is to obtain knowledge about classification and nomenclature of medicinal plants, as well as several active substances, their chemical and biological properties. Brief Description of the Course (Annotation): Pharmacognosy is a branch of pharmacy that investigates medicinal plants, herbs in form of dried or raw plant material or their parts, which are used as raw material in preparing pharmaceutical preparations or semimedicinal products; also products of first/basic reprocessing of plant or animal raw material, such as essential oils, fatty oils, resins, etc. and individual or groups of compounds from above mentioned raw material that are used in medicine. Classification and nomenclature of medicinal plants are discussed, as well as factors influencing content of active compounds, cultivation of medicinal plants and collecting herbs, drying, storing, and determining quality of herbs. Introduced are several active substances (hydrocarbons, phenols, phenol glycosides, essential oils, cardiac glycosides, alkaloids, etc.) in terms of their classification, physico-chemical and biological properties, and more important herbs containing these active substances. Languages of Teaching: Estonian Study Period (in weeks): 16 Lecturers: A. Raal Course Web Page: It is available from Intranet

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) 48 hours of lectures, 72 hours of practicals, 80 hours of independent work

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

10. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and
available at the institute's library are given in the separate appendix.

- 6. Textbooks in Estonian available from Intranet (https://www.is.ut.ee/pls/ois/!tere.tulemast)
- 7. Ain Raal. Tervist ja vürtsi maailma maitsetaimedest. Tallinn, Valgus, 2005 [in Estonian]
- 8. W. C. Evans. Trease and Evans' Pharmacognosy, 15th ed. Edinburgh [etc.], Saunders, 2000
- 9. Д. А. Муравьева, И. А. Самылина, Г. П. Яковлев. Фармакогнозия, 4-е изд., перераб. и доп. Москва, Медицина, 2002 [in Russian]
- 10. Ain Raal. Taimedes talletuv tervis. Tallinn, Valgus, 2003 [in Estonian]

Available teaching Resources

- ☐ Teaching materials for lecture / classroom demonstration
- ☐ Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- □ Laboratory and technical equipment

5. Assessment

Way of Final Assessment

- 🖾 🗌 Continuous assessment
- ☑ □ Practical work or bedside evaluation

Written (test)

🛛 🗌 Oral

Composition of the Final Assessment (grade)

Final assessment: oral exam, three questions: 1) very general (for example Flavonoids), 2) more detailed (Physico-chemical characterization of Coumarins), 3) five drugs (Uvae ursi folium, Frangulae cortex, etc). Exam result is graded according to the Study Regulations of University of Tartu: E to A is regarded as pass and F is regarded as failure.

Programme

Lectures

Week	Торіс	Lecturer
1.	Introduction to pharmacognosy. The origins of pharmacognosy.	A. Raal
2.	The scope and practice of pharmacognosy. Plant and drug nomenclature.	A. Raal
3.	Biological and geographical sources of drugs. Collecting, drying and storing of herbs. Determination the quality of herbs. Legislation and medicinal plants in Estonia.	A. Raal
4.	Principles related to the phytotherapy. Pharmacological activities of drugs and their compounds. Herbal medicine. Making of herbal teas and mixtures.	A. Raal
5.	Hydrocarbons and derivatives: hydrocarbons, monobasic acids, bibasic and tribasic acids, alcohols, esters, fixed oils and fats, waxes. Herbs containing hydrocarbons.	A. Raal
6.,7.	Carbohydrates: saccharides, fibres and products, regenerated carbohydrate material and chemically modified fibres, starches, fructans, algal gelling agents, gums, mucilages, miscellaneous carbohydrate-containing drugs. Chemical structure and classification. physico-chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs and drugs containing carbohydrates.	A. Raal

8.	Phenols and phenolic glycosides. Simple phenolic compounds. Chemical structure and classification. physico-chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing simple phenolic compounds and glycosides.	A. Raal
9.	Coumarins and glycosides: simple coumarins, furanocoumarins, pyranocoumarins, dicoumarins, aflatoxins, etc. Chemical structure and classification. physico-chemical properties, extraction, characterixation, quantification, occurrence, biological properties, therapeutic uses. Herbs containing coumarins and glycosides.	A. Raal
10.	Anthraquinones and glycosides: anthraquinones, anthranols and anthrones, oxanthrones, dianthrones, etc. Chemical structure and classification. physico-chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing anthraquinones and glycosides.	A. Raal
11., 12.	Flavonoids. Chemical structure and classification. physico- chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing	A. Raal
13.	Tannins: hydrolysable tannins, condensed tannins, pseudotannins, complex tannins. Chemical structure and classification. physico-chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing tannins. Galls and tannic acid.	A. Raal
14.	Other polyphenols: lignans, neolignans, chromones, naphtoquinones, xanthones, etc. Chemical structure and classification. physico-chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing other polyphenols.	A. Raal
15.	Steroids: Saponins. Chemical structure and classification. physico-chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing saponins.	A. Raal
16.	Steroids. Cardiac glycosides. Other steroids. Chemical structure and classification. physico-chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing cardiac glycosides and other steroids.	A. Raal

Laboratory work

Week	Торіс	Teacher
1.	Introduction to microscopy. Lini semen, Althaeae radix, Eucalypti folium, Absinthii herba, Millefolii herba.	U. Paaver
2.	Serpylli herba, Thymi herba, Menthae folium, Salviae folium, Nepetae folium, Melissae folium, Anisi fructus, Carvi fructus, Coriandri fructus, Foeniculi fructus.	U. Paaver
3.	Calami rhizoma, Valerianae radix, Chamomillae flos, Menyanhthidis folium, Taraxaci radix, Papaveris immaturi fructus, Hyperici herba, Chelidonii herba, Convallariae herba, Adonidis herba.	U. Paaver
4.	Belladonnae folium, Hyoscyami folium, Stramonii folium, Thermopsidis herba, Digitalis folium, Secale cornutum, Strychni semen, Glycyrrhizae radix.	U. Paaver
5.	Bistortae rhizoma, Tormentillae rhizoma, Leonuri herba, Quercus cortex, Viburni cortex, Frangulae cortex, Rhei rhizoma, Filicis	U. Paaver

	maris rhizoma.	
6.	Uvae ursi folium, Sinapis semen, Ledi palustris cormus, Polygoni	U. Paaver
	avicularis herba, Polygoni hydropiperis herba, Polygoni	
	persicariae herba, Farfarae folium, Bursae pastoris herba.	
7.	Macroscopy and microscopy of the powdered drugs.	U. Paaver
8.	Colloquia: Microspocy of the drugs, macroscopy and microscopy	U. Paaver
	of the powdered drugs.	
9.	Standardization and commercial analyse of drugs	U. Paaver
10.	Herbal teas and mixtures: composition and analysis	A. Raal
11.	Loss of drying	U. Paaver
12.	Water- or alcohol-soluble extractives	U. Paaver
13.	Microdestillation and TLC-analyse of essential oils.	U. Paaver
14.	Quantitative determination of essential oils by the method of	A. Raal
	European Pharmacopoeia. Fotometric analyse of some essential	
	oils.	
15.	Qualitative and quantitative GC-analyse of essential oils.	U. Paaver
16.	Preliminary examination (Laboratory works)	A. Raal and U.
		Paaver

TOTAL HOURS 120

1. Identification

Name of Department: Department of Pharmacy			Code of Department. ARFA
<i>Course Title in English and Estonian</i> :			Subject Code:
Cultivation of Medical Plants – Ravimtaimede kultiveerimine			ARFA.01.031
National Credits (CP):	ECTS Credits (CP):		
2	3		
<i>Study Level (Name of Curriculum):</i> Pharmacy		Location in (semesters 5	Curriculum):

2. Brief Description

 Objectives and Outcomes of the Course:

 During this course students acquire practical knowledge (how to grow, gather and dry) about medicinal plants.

 Brief Description of the Course (Annotation):

 Cultivation of medicinal plants relates to growing medicinal plants in the culture but also taking them

into the culture and introducing. Different agricultural techniques are introduced, such as preparing soil and seeds for sow, sow techniques, additional fertilizing. Special attention is paid to the principles of mild agriculture, species that need pre-cultivation, also replanting of precultivated species to the open field. Students acquire the basic knowledge about phenological observations, collection different herb species and their drying and basic processing. During independent work, students learn to know natural growing regions of different medicinal plants and species under nature protection. They have to learn general signs of plant families, requirements for cultivation and collection.

Languages of Teaching: Estonian

Study Period (in weeks): 2 weeks (8 days)

Lecturers: Ain Raal, Urve Paaver

Course Web Page: Not available. http://www.med.ut.ee/169800

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures 2 hours, practicals 46 hours, independent work 32 hours

3. Course Structure and Content

The detailed course structure and content schedule: This course carries out as a group work during the summertime. Exact time and content of the course depends on weather.

Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.

- 7. U.Paaver Ravimtaimede kultiveerimine. Õppevahend proviisoriõppe üliõpilastele, 2005.
- 8. Eesti taimede määraja. H.Krall, T.Kukk, T.Kull, V.Kuusk, M.Leht, T.Oja, Ü.Reier, S.Sepp, H.Zingel, T.Tuulik, 1999.
- 9. A Modern Herbal. Tiger Books Internatsional PLC, London, 1998.

Available teaching Resources

- I Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation
- Written (test)

Written	(essay)
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\boxtimes	Oral
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\boxtimes	Combination
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None

Composition of the Final Assessment (grade)

Qualification to the final assessment: doing all practical works. Final assessment: written preliminary exam: multiple choice questions + identifying medical plants growing in medical plants section of the Botanical Garden of the University of Tartu.

1. Identification

Name of Department.			Code of Department.
Department of Pharmacy			ARFA
Course Title in English and Estonian:			Subject Code:
Pharmaceutical Chemistry III			
Farmatseutiline keemia III			ARFA.02.076
		`	
National Credits (CP):	ECTS Credits (CP)):	
3	4,5		
			O via Las
Study Level (Name of Curriculum):		Location in	Curriculum
Pharmacy		(semesters):
			VI

2. Brief Description

Objectives and Outcomes of the Course: The aim of pharmaceutical chemistry is to introduce pharmacy students to the chemical origin and to the methods of qualitative and quantitative analysis of medical substances.

Brief Description of the Course (Annotation): Analysis of the most important active substances and theoretical basis are learned.

Languages of Teaching: Estonian

Study Period (in weeks): 16 weeks

Lecturers: Toivo Hinrikus

Course Web Page:

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures, practicals, independent work

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

11. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix. European Pharmacopoeia, 5th Edition, volume 1,2. 2005. Council of Europe, Strasbourg. European Pharmacopoeia, 6th Edition, volume 1,2, 2008, Council of Europe, Strasbourg. Belikov V.G. Farmatsevtischeskaja chimija. 4th Edition.2007, Moskva: MEDpress-inform. Gosudarstvennaja farmakopeja SSSR. 1968, Moskva: Meditsina. Eger, K., Troschütz, R., Roth, H. J. Arzneistoffanalyse. Reaktivität. Stabilität. Analytik Deytscher Apotheker Verlag, Stuttgart, 1999. Hinrikus, T., Meos, A. Raviained vitamiinidest: omadused ja analüüsimine.2007, Tartu, Tartu Ülikool.

Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation
- Written (test)
- 🛛 Oral

Composition of the Final Assessment (grade)

Final assessment: short essay questions and multiple choice test, in total 30 points, exam result is graded

according to the university general rules from F (insufficient, not passed) to A (excellent). Prerequisites to

complete the course and to participate in the exam: written intermediate tests passed, participation in all

practicals.

Programme Lectures

Week	Торіс	Lecturer
1.	Vitamins: aliphatic compounds.	T. Hinrikus
2.	Vitamins: alicyclic compounds.	T. Hinrikus
3.	Vitamins: heterocyclic compounds.	T. Hinrikus
4.	Vitamins: heterocyclic compounds.	T. Hinrikus
5.	Vitamins: heterocyclic compounds.	T. Hinrikus
6.	Hormones and hormone like substances: compounds of	T. Hinrikus
	amino alcohol and amino acid.	
7.	Hormones and hormone like substances: compounds of	T. Hinrikus
	steroid hormones.	
8.	Hormones and hormone like substances: compounds of	T.Hinrikus
	synthetic analogues of corticosteroids.	
9.	Hormones and hormone like substances: androgens.	T. Hinrikus
10.	Hormones and hormone like substances: estrogens.	T. Hinrikus

11.	Hormones and hormone like substances: synthetic analogues of	T. Hinrikus
	estrogens. Gestagens.	
12.	Antibiotics: alicyclic compounds.	T. Hinrikus
13.	Antibiotics: aromatic compounds.	T. Hinrikus
14.	Antibiotics: heterocyclic compounds.	T. Hinrikus
15.	Antibiotics: heterocyclic compounds.	T. Hinrikus
16.	Antibiotics – glycosides. Prostaglandins.	T. Hinrikus

Laboratory work

Week	Торіс	Teacher
1.	Identification and assay of unknown inorganic medicinal substance.	T. Hinrikus
2.	Identification and assay of unknown organic medicinal substance.	T. Hinrikus
3.	Identification and assay of unknown organic medicinal substance.	T. Hinrikus
4.	Identification and assay of unknown inorganic or organic medicinal substance.	T. Hinrikus
5.	Analysis of vitamin preparations. Test.	T. Hinrikus
6.	Qualitative analysis of pharmaceutical formulations (powders).	T. Hinrikus
7.	Qualitative and quantitative analysis of pharmaceutical formulations (powders).	T. Hinrikus
8.	Qualitative analysis of pharmaceutical formulations (solutions).	T. Hinrikus
9.	Qualitative and quantitative analysis of pharmaceutical formulations (solutions).	T. Hinrikus
10.	Qualitative and quantitative analysis of pharmaceutical formulations (solutions).	T. Hinrikus
11.	Analysis hormones and hormone like substances. Test.	T. Hinrikus
12.	Qualitative analysis of pharmaceutical formulations (ointments).	T. Hinrikus
13.	Qualitative and quatitative analysis of pharmaceutical formulations (powders, solutions or ointments).	
14.	Analysis of antibiotics I.	T. Hinrikus
15.	Analysis of antibiotics II. Test.	T. Hinrikus
16.	Workshop.	T. Hinrikus

Subtotal hours 40

TOTAL HOURS 72

ARFA.01.045 Course Outline

1. Identification

Name of Department. Institute of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian:			Subject Code:
Phytochemistry/Fütokeemia			ARFA.01.045
National Credits (CP):	ECTS Credits (CP):		
3	4.5		
Study Level (Name of Curriculum):	l	Location in	Curriculum
Pharmacy		(semesters, VI):

2. Brief Description

Objectives and Outcomes of the Course:

Brief Description of the Course (Annotation):

Phytochemistry is a branch of pharmacy, and more specifically, a branch of pharmacognosy that relates to chemistry (qualitative and quantitative analysis by chemical and phytochemical methods) of individual compounds or groups of compounds present in products of basic reprocessing of medicinal plants, herbs or plant raw material. Phytochemistry relates to extraction of active compounds from herbs, their cleaning, isolating, and chemical analysing (sublimation, distillation, fractional crystallisation, chromatography and spectrometry methods) but also biogenetical investigations and biosynthesis of main primary and secondary metabolites (enzymes, carbohydrates, fats and fatty acids, aromatic compounds, amino acids, peptides and proteins, isoprenoids). Practical works involve qualitative and quantitative determination of main groups of active substances (alkaloids, terpenoids, cumarines, flavonoids, phenol glycosides, saponines, etc.) in herbs.

Languages of Teaching: Estonian

Study Period (in weeks): 13 weeks of lectures and 16 weeks of practicals

Lecturers: A. Raal

Course Web Page: It is available from Intranet

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) 26 hours of lectures, 48 hours of practicals, 46 hours of independent work

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

12. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.

11. Textbooks in Estonian available from Intranet (https://www.is.ut.ee/pls/ois/!tere.tulemast)
12. Ain Raal. Tervist ja vürtsi maailma maitsetaimedest. Tallinn, Valgus, 2005 [in Estonian]
13. W. C. Evans. Trease and Evans' Pharmacognosy, 15th ed. Edinburgh [etc.], Saunders, 2000
14. Д. А. Муравьева, И. А. Самылина, Г. П. Яковлев. Фармакогнозия, 4-е изд., перераб. и
доп. Москва, Медицина, 2002 [in Russian]
15. Ain Raal. Taimedes talletuv tervis. Tallinn, Valgus, 2003 [in Estonian]
Available teaching Resources
Teaching materials for lecture / classroom demonstration
Teaching / learning materials to be distributed among students
🖂 🔲 Teaching / learning materials in Internet
🖂 🔲 Laboratory and technical equipment

5. Assessment

Way of Final Assessment

Continuous assessment

 \square Practical work or bedside evaluation

Written (test)

🛛 🗌 Oral

Composition of the Final Assessment (grade)

Final assessment: oral exam, three questions: 1) very general (for example Terpenes), 2) more detailed (Chemical structure and classification of Alkaloids), 3) five drugs (Absinthii herba, Carvi fructus, etc). Exam result is graded according to the Study Regulations of University of Tartu: E to A is regarded as pass and F is regarded as failure.

Programme

Lectures

Week	Торіс	Lecturer
15.	Terpenes. Essential oils. Chemical structure and classification of terpenes in essential oils, physico-chemical properties, obtaining, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing essential oils.	A. Raal
67.	Other terpenes: monoterpenes, diterpenes, sesquiterpenoid lactones, triterpenes, tetraterpenes, polyterpenes. Chemical structure and classification of terpenes in essential oils, physico- chemical properties, obtaining, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing other terpens.	A. Raal
811.	Alkaloids. Chemical structure and classification. physico- chemical properties, extraction, characterization, quantification, occurrence, biological properties, therapeutic uses. Herbs containing alkaloids.	A. Raal
12.,13.	Natural and commercial products of animal origin. Snake poison. Apitoxine, apilac and propolis. Other products from animal kingdom.	A. Raal

Subtotal hours 26

Laboratory work

Week	Торіс	Teacher
1.	Using of Internet resources	A. Raal
2.	SCREEN-technique analyse of constituents in drugs	D. Volmer
3.	Determination of bitterness value in drugs	A. Raal
4.	Quantitative analyse of saponins in drugs	A. Raal and D.
		Volmer
5.	Quantitative analyse of arbutine in drugs	A. Raal and D.
		Volmer
6.	Quantitative analyse of anthocyanes in drugs	A. Raal and D.
		Volmer
7.	Quantitative analyse of hyperoside in Hypericum perforatum	A. Raal and D.
		Volmer
8.	Quantitative analyse of coumarines in drugs	A. Raal and D.
		Volmer
9.,10.	Qualitative and quantitative analyse of antraquinones in drugs	A. Raal and D.
		Volmer
11.	Quantitative analyse of carotenes in drugs	A. Raal and D.
		Volmer
12.	Quantitative analyse of tropane alkaloids in drugs	A. Raal and D.
		Volmer
13., 14.,	Qualitative analyse of purine alkaloids in tea and coffe	A. Raal and D.
		Volmer
15.	Colloquia: Phytochemical analyze of drugs	D. Volmer
16.	Preliminary examination (Laboratory works)	A. Raal and D.
		Volmer

Subtotal hours 48

TOTAL HOURS 74

1. Identification

Name of Department. Institute of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian: Pharmacoepidemiology and pharmacoeconom Farmakoepidemioloogia ja farmakoökonoomika	ics a		Subject Code: ARFA.01.059
National Credits (CP): 2	ECTS Credits (CP, 3.5):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters VII	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course:

Basic knowledge in pharmacoepidemiology and pharmacoeconomics.

Brief Description of the Course (Annotation):

Pharmacoepidemiology is the study on the use of and the effects of medicines in large numbers of people (Strom 1994). Pharmacoepidemiological studies aim to quantify the risks and benefits of drug treatment in different populations. Study results can be used to find the most effective medicine to the patient

Pharmacoeconomics is the study of the costs and outcomes associated with the use of pharmaceutical services and products. It is closely related to outcomes research which is the scientific measurement of the impact of antecedent health care.

During this course general knowledge and methods of analysis of both above mentioned disciplines will be given.

Languages of Teaching: Estonian

Study Period (in weeks): 16

Lecturers:

Piret Veerus, Heti Pisarev, Ly Rootslane, Jana Lass, Alar Irs

Course Web Page: http://www.med.ut.ee/198539

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)

Lectures 16 hours, seminars 32 hours.

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

13. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and

available at the institute's library are given in the separate appendix.

- 1. Strom BL (2006). Pharmacoepidemiology, 4th ed. Wiley, Chichester (etc.).
- 2. Greenhalg T. (2006). How to Read a Paper: the Basis of Evodence-based medicine, 3rd ed. BMJ Publ.
- 3. Ingman WHW (2001). Monitoring for Drug Safety, 2nd ed. Springer.
- 4. Smith MC, et al. (2002). Pharmaceutica Marketing: principles, environment and practice. Pharmaceutical Product Press, New Pharmaceutical Press, New York (etc.).

Available teaching Resources

- I Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment

Continuous assessment

Practical work or bedside evaluation

Written (test)

Written (essay)

🛛 Oral

Combination

Other

None

Composition of the Final Assesment (grade)

Qualification to the final assessment: participation in all seminars, completing of oral and written assignments.

Final assessment: written exam, multiple choice questions + short essay questions, total 70 points. Exam result is graded according to the Study Regulations of University of Tartu: E to A is regarded as pass and F is regarded as failure.

Programme

Lectures

Week	Торіс	Lecturer
1.	Introduction to the course. Use, terms and definitions of pharmacoepidemiology and –economics. Drug utilisation research to support rational pharmacotherapy and role of pharmacoepidemiology in drug safety. Applications of pharmacoeconomics: scarcity of resources, opportunity cost and need for rational decision-making.	Alar Irs
2.	Pharmacoepidemiology (definition and principles, premarketing and postmarketing studies, ethical aspects of pharmacoepidemiological studies)	Piret Veerus
3.	Biostatistics (definitions of descriptive and analytical statistics,	Heti Pisarev

	calculation of p-value, normal distribution, confidence interval)	
4.	Pharmacoepidemiological studies (descriptive, cross-sectional, correlational ecological observational cohort intervention	Piret Veerus
	studies, registry based studies, randomisation, sample size)	
5.	Drug utilization (definitions, history, study methods: quantitative studies and qualitative studies, drug utilization review, presentation of the study results: economical, Purchasing Power Parties; quantitative calculation; information from databases; DDD's; PDD; ATC classification)	Ly Rootslane
6.	Drug utilization in hospital (drug formularies, the role of hospital pharmacist in evaluation of appropriate drug utilization, clinical pharmacy, pharmaceutical care)	Jana Lass
7.	Drug utilization in Estonia (drug statistics by wholesale price, pharmacy statistics: retale sale of the medicines, reimbursement of prescription medicines, extemporaneous medicines)	Ly Rootslane
8.	Introduction to the methods of pharmacoeconomics: cost- minimisation, cost-effectiveness and cost-utility analyses. Incremental cost effectiveness ration. Sources of data for PE analysis.	Alar Irs

Subtotal hours 16.

Seminars

Kuupäev	Торіс	Lecturer
13.09.2007	Methods in pharmacoepidemiology (evaluation of different methods applied for pharmacoepidemiological studies, group work)	Piret Veerus
20.09.2007	Basic calculations in biostatistics (calculation of frequences, p-value, normal distribution)	Heti Pisarev
27.09.2007	Critical evaluation of pharmacoepidemiological studies (evaluation of scientific articles, group work)	Piret Veerus
04.10.2007	Drug utilization studies (introduction to ATC classification, calculation of DDD's)	Ly Rootslane
11.10.2007	Clinical pharmacy in practice (case studies of particular patients: evaluation of condition of the patient, assessment of prescribed medicines and the results of laboratory test, advise to the physician)	Jana Lass
18.10.2007	Critical evaluation of drug utilization studies (evaluation of scientific articles, group work)	Ly Rootslane
01.11.2007	Introductory seminar. Simple exercises 'in at the deep end': average and comparative cost-effectiveness of thrombolytics in MI (drug costs only), comparative cost-effectiveness of LMWH and UFH (drug and non-drug costs).	Alar Irs
08.11.2007	RCT. Factors influencing the quality of RCT. Types of analysis (PP; ITT), metrics (RD; RR; OR; NNT), basic statistics (hypothesis testing, 95% CI).	Alar Irs
29.11.2007	Systemic review of RCT-s, meta-analysis. Quality aspects of meta-analysis. Costs: identification, measurement, valuation. Sources of cost data.	Alar Irs
06.12.2007	Methods of QoL measurement (VAS, standard gamble, time trade-off, EuroQoL). QALY.	Alar Irs
13.12.2007	Factors influencing the credibility of PE analyses. Critical appraisal. International applicability of results. Role of PE (vs equity etc other issues) in decision-making.	Alar Irs

Subtotal hours 32

TOTAL HOURS 48

1. Identification

Name of Department: Institute of Pharmacy			Code of Department: ARFA
Course Title in English and Estonian:			Subject Code:
Pharmaceutical management; Farmaatsiakorraldus		ARFA.01.058	
National Credits (CP): 4	ECTS Credits (CP) 6):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 7	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: The student has a good knowledge of the mission of the Ministry of Social Affairs and State Agency of Medicines assignments, management of pharmacies. Handling of medicinal products, storage, rules of carriage. The order and direction of production of medicinal products, import, export, wholesale, clinical trials in connection with medicaments, economic and financial acts of pharmacies and legislation in connection with them.

Brief Description of the Course (Annotation):

Medicament politics and aid. The Law of medicaments. Statute of the medicament department. Dealings with medicaments (licences, preservation of medicaments, rules of carriage, dealings with narcotic and psychotherapeutic substances). The order and directions of the production of medicaments, import, export, wholesale selling, registration of medicaments, clinical tests in connection with medicaments. Management of pharmacies health protection standards and directions, labour rules of an institution, labour contract, protection of labour, control accounts and rendering accounts, economic and financial acts of pharmacies and legislation in connection with them, check up over pharmaceutical acts and state inspection.

Languages of Teaching: Estonian

Study Period (in weeks): 16 weeks

Lecturers: Tea-Mai Tammaru

Course Web Page: http://:www.med.ut.ee/150463

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)

Lectures 32 hours, seminars 64 hours, independent work

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

14. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix. **Palun lisage siia kuni 5 põhiõpikut/põhiõppematerjali, võivad korrata üldist instituudis olemasolevate õpikute loetelu!**

- 1. T.-M.Tammaru Farmaatsiakorraldus, TÜ Arstiteaduskond, Farmaatsia instituut, 2007
- 2. Riigi Teataja (seadused, määrused)



https://www.riigiteataja.ee/ert/ert.jsp

- 3. A.Siimon, K.Türk Juhtimine, TÜ Kirjastus, 2003
- 4. Asko Miettinen jt. Ettevõtlus II, Kirjastus "Külim", 2008
- 5. Pharmaca Eestica, 2007

Available teaching Resources

- I Teaching materials for lecture / classroom demonstration
- Teaching / learning materials in Internet

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation
- Written (test)
- 🛛 Oral
- Combination
- Other

Composition of the Final Assessment (grade) Oral examination,

Qualification to the final assessment: participation in all seminars, completing of oral and written assignments, presentation balance, the presentation and defence of project for a pharmacy.Final assessment: oral examination that consist of the 3 different points (work rules, legislation, laws).Examination result is graded according to the Study Regulations of University of Tartu: E to A is regarded as pass and F is regarded as failure.

Programme Lectures

Week	Торіс	Lecturer
1.	Introduction into pharmaceutical management. The	T.M.Tammaru
	management of public health and medical therapy in the	
	Republic of Estonia. The tasks of the Ministry of Social Affairs	
	and the State Agency of Medicines of the Estonian Republic,	

	their standing order and policy of medicines.	
2.	The fundamental functions of a pharmacy, different types of	T.M.Tammaru
	pharmacies, peculiarities of pharmaceutical economy, services	
3	The Medicinal Products Act of the Republic of Estonia, different	
5.	regulations and rules. The Narcotics and Psychotropic Act and	1.IVI. I diffifiatu
	its implementation in pharmacies. Medical apparatus Act.	
	Labelling.	
4.	Health protection, requirements for hygienic, general weal and	T.M.Tammaru
	microclimate. Instructions for projecting pharmacies. Rules for	
	preservation medications and transport. Material liability in a	
5	Medical insurance Act Foundations for marketing and	T M Tammaru
0.	international marketing.	1.ivi. Familiara
6.	Characterisation of calculation and rendering accounts.	T.M.Tammaru
	Calculation Act and domestic rules.	T N T
7.	Labour and Holidays Act. The Holidays Act of the Republic of	I.M. I ammaru
	estonia, the arrangement and different types of holidays of the	
	the Estonian Republic the system of arrangement of wages in	
	the network of pharmacies.	
8.	The Republic of Estonia Employment Contracts Act.	T.M.Tammaru
	The Public Service Act and their implementation.	
9.	The Occupational Health-Care and Occupational Safety Act,	T.M.Tammaru
	requirements and additional documents in connection with them.	
10	Fire and Rescue Acts.	T M T
10.	Consumer Protection Act. The Competition Act and its revelation	T.IVI. Fammaru
	in the network of pharmacles. The Trade Marks Act, International	
11	Specification of the situation prior to bankruntcy according to	T M Tammaru
	special pattern and the Bankruptcy Act of the Estonian Republic.	1.ivi. Farmara
12.	The Law of Property Act and its implementation in the network of	T.M.Tammaru
	pharmacies. Law of Obligations Act.	
13.	Penal Code	T.M.Tammaru
14.	The history of pharmaceutical education in Tartu University,	T.M.Tammaru
	pharmaceutical staff, studies the doctor's degree, the laws of a	
15	University and the law of Tartu University.	TMTommoru
15.	Acts indirectly related to phermaceutics: The Chemicals Act, the	T.M.Tammaru
10.	Metrology Act the State Fees Act. The Dublic Health Act, the	1.1VI. 1 al 1111 al U
	Convright Act the Law of Succession Act the Unemployed	
	Persons protection Act, etc.	
	····· F -····· ···· ··· ··· ···	1

Seminars

Week	Торіс	Teacher
1.	The order of elaboration of legislative acts-acts (laws),	T.M.Tammaru
	regulations, decrees, circulars, specimens of them. The Law of	
	public announcer, EU documents, patients rules, Business code	
	of the Estonian Republic	
	The establishment of a company, private pharmacy, business	
	plan and documents. Handling of medicinal products; activity	
	licences, register of activity licences.	
2.	Role of the State Agency of Medicines in EU, structure,	T.M.Tammaru
	pharmacy service, pharmacy chains.	
	The management of a pharmacy and a company. The types of	
	the network of communication and management. The job	

	specifications of an analyst and other jobs in pharmacy.	
3.	Medicines sold without a prescription and other commodities in pharmacies. The job specification and standing order of a retailer. The art of servicing and disposal process in pharmacy. Cure of one's own wisdom. Client card.	T.M.Tammaru
4.	Extemporaneous medicines: requirements for compounding and dispensing.	T.M.Tammaru
5.	The projection of pharmacies and health care standards. With the help of catalogues we get acquainted with the internal design and equipment in pharmacies in different countries (Finland, Sweden, Austria, Germany, France, Italy the USA, etc.)	T.M.Tammaru
6.	The preservation and transport of medicines and medical commodities. The order of dealing with medicines in excess of their date of disposal. Narcotics and Psychotropic medicinal products.	T.M.Tammaru
7.	Marketing authorisation of medicinal products: new applications and renewal of licences. Import and export of medicinal products. Test I	T.M.Tammaru
8.	The clinical research of medicines and documentation.	T.M.Tammaru
9.	The order of production of medicines, the main producers.	T.M.Tammaru
10.	The order of wholesale trading of medicines, the most important wholesale dealing companies in Estonia.	T.M.Tammaru
11.	The account of tangible assets (fixed assets, current assets, commodities, tare packaging) in a pharmacy and documents, stock-taking and documents. The Taxation. The account of pay, average pay, injury benefits, holiday pay, expenses for business trips. The basic outline of balance, The opening day balance, the solvency of an enterprise, the analysis of expense and gain, proportion of cost effectiveness. Practise of account entries.	T.M.Tammaru
12.	The state supervision over pharmaceutical activity and inspection in a pharmacy. The order of prescribing medicines, evaluation of prescriptions and check- up of prescribed doses.	T.M.Tammaru
13.	The evaluation of prescriptions in the pharmacies of Tartu University	T.M.Tammaru
14.	Register of medicinal products, register of pharmacist, registration, centre of codes. Labour law acts in a pharmacy (domestic rules, employment contracts, personal service records, rules of labour protection and safety regulations, the account of occupational accidents and illnesses, a report on an occupational accident and its compiling. Test II	T.M.Tammaru
15.	Charging with a debit and giving credit of accounts, the composition of balance independently.	T.M.Tammaru
16.	A seminars of laws (discussion in groups). The presentation and defence of project for a pharmacy.	T.M.Tammaru

TOTAL HOURS 96

1. Identification

Name of Department: Institute of Pharmacy			Code of Department: ARFA
Course Title in English and Estonian: Galenical Pharmacy, galeeniline farmaatsia			Subject Code: ARFA 02.096
National Credits (CP): 6	ECTS Credits (CP) 9):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters VII, VIII	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course:

The course gives an overview of manufacturing processes and analytical methods of medicines in pharmaceutical industry. Students, that have past this course, must be able to prepare and analyse aseptic pharmaceutical formulations and herbal formulations - tinctures, extracts. The students must know the quality criteria as well as different manufacturing methods and pharmaceutical excipients of industrial pharmaceutical preparations.

Brief Description of the Course (Annotation):

Galenical pharmacy is a study of the preparation of dosage forms in pharmaceutical industry. The course gives an overview of manufacturing of aseptic pharmaceutical formulations and different methods of sterilization as well as of manufacturing and analysing methods of industrial dosage forms (tablets, capsules) and herbal formulations (tinctures, extracts). In practical work(s) the students prepare and analyse various aseptic pharmaceutical formulations (injections, eyedrops and - ointments) and herbal formulations (tinctures, extracts).

Languages of Teaching: Estonian

Study Period (in weeks): 32

Lecturers: Peep Veski, Piret Kreutzwald

Course Web Page: www.med.ut.ee/farmaatsia

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures 64 hours, seminars and laboratory works 80 hours, independent work 96 hours

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

15. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and

available at the institute's library are given in the separate appendix.

- 1. M.E. Aulton. Aulton's Pharmaceutics> The Design and Manufacture of Medicines. 2007
 - 2. R.I. Mahato. Pharmaceutical Dosage Forms and Drug Delivery. 2007
- R.C. Rowe, P.J. Sheskey, P.J. Weller. Handbook of Pharmaceutical Excipients, 4th Ed. 2003
 Banker, G.S., Rhodes, C.T. Modern pharmaceutics. 1996
- 5. European Pharmacopoeia, 6th Ed. 2008.

Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation

Written (test)

Written (essay)

- Oral
- ⊠ Combination
- Other
- □ None

Composition of the Final Assessment (grade)

Qualification to the final assessment: participation in all practical works and seminars, 3 intermediate practical and theoretical tests past.

Final assessment: oral exam - 3 questions. Exam result is graded according to the Study Regulations of University of Tartu: E to A is regarded as pass and F is regarded as failure.

Galenical pharmacy - Programme

Programme

Lectures

Week	Торіс	Lecturer
1.	Aseptic working conditions. Clean room. Definitions. Preparation	P. Kreutzwald
	of aseptic pharmaceutical formulations in chemistry and in pharmaceutical industry.	
2.	Parenteral preparations - formulations, manufacturing methods, quality criteria (European pharmacopoeia), drugs and excipients, containers.	P. Kreutzwald
3.	Infusions – physiological and nonphysiological infusions (definitions, manufacturing, excipients, using)	P. Kreutzwald
4.	Eye preparations – solutions and semisolid eye preparations (eyedrops, ointments, creams, ophthalmic inserts <i>etc</i>).	P. Kreutzwald

	Definitions, manufacturing, excipients.	
5.	Sterilization: mechanical sterilization. Sterilization by filtration -	P. Kreutzwald
	definitions, filter materials, factors affecting the speed of	
	filtration. Sterilization by ultrasound.	
6.	Sterilization: thermic sterilization. Sterilization by steam under	P. Kreutzwald
	pressure (autoclave). Sterilization by dry heat. Sterilization by	
	tyndallisation. Sterilization by IR. Sterilization by H.F. Mechanism	
7	Sterilization: sterilization by ionizing radiation. Camma-radiation	P. Kroutzwald
7.	Sterilization, Sterilization by UN/ Mechanism of sterilization, Using of ionizing	F. Neutzwalu
	radiation. Measure units.	
8.	Sterilization: chemical sterilization. Sterilization by gases	P. Kreutzwald
	(ethylene oxide). Antimicrobial preservatives. Groups of	
	chemical substances available for use as sterilization agents	
	and/or antimicrobial preservatives, their mechanisms of action.	
9.	Vehicles for parenteral preparations: Water. EP monographs,	P. Kreutzwald
	definitions, quality criteria. Pyrogens and bacterial endotoxins -	
	definitions, determination, removing/elimination of	
10	pyrogens/bacterial endotoxins.	
10.	Venicles for parenteral preparations: Vegetable fatty oils. EP	P. Kreutzwald
	nonograph, definitions, quality chiena. Sources, Essential and	
	vegetable fatty oils. Hydrogenated vegetable fatty oils	
11.	Suspensions for parenteral use – definitions, manu-facturing.	P. Kreutzwald
	excipients, quality criteria, using).	
12.	Emulsions for parenteral use – definitions, manu-facturing,	P. Kreutzwald
	excipients, quality criteria, using).	
13.	Containers for injections: glass containers. Glass as material for	P. Kreutzwald
	containers. EP monograph, definitions, manufacturing, quality	
	criteria for glass and glass containers.	
14.	Containers for injections: plastic containers. Plastic materials,	P. Kreutzwald
	polymers. EP monograph, definitions, manufacturing of plastics	
15	Modification of action of parenteral preparations (prolongation	P Kroutzwald
15.	site-specific preparations etc) Definitions methods of	
	manufacture (biochemical, chemical and galenical methods).	
	using purposes/possibilities.	
16.	Using of micro- and nanoparticles, liposomes etc. in parenteral	P. Kreutzwald
	preparations. Definitions, manufacturing methods, using	
	purposes/possibilities.	
24.	Preparations for inhalation – definitions. EP monographs.	P. Veski
	Manufacturing principles. Excipients (propellants). Containers.	
25	Dising of preparations for initial proparations, made, from living	P. Vocki
25.	organisms their organs tissues and products Hormones	F. VESKI
	(adrenalin, cortin, thyroxin, insulin <i>etc.</i>).	
26.	Biologicals: enzymes (pepsin/gastric fluid, pancreatin, trypsin	P. Veski
-	etc.), herbal enzymes (papain, bromelin etc.), biliarin,	
	hyaluronidas, splenin, pantocrin etc.	
27.	Biostimulators. Phytoncide preparations. Definitions, using	P. Veski
	purposes/possibilities. Preparations made from Aloe, Garlic,	
	mud etc.	
28.	I ablets – classification, general principles of disaining.	P. Veski
29.	Lablets – general principles of manufacturing. Granulation.	P. VESKI
20	Direct compaction. Excipients.	D Vooki
30. 31	Tablets – techological procedures: mixing drving compaction	P VESKI
51.	Fluidized bed.	I. V CONI
32.	Tablets – techological procedures: drying, compaction.	P. Veski

	monograph.	
34.	Hard capsules – classification by EP, definitions. Gelatin and other capsule shell materials (sources, manufacturing, quality criteria). Manufacturing of capsule shells, excipients, quality criteria.	P. Kreutzwald
35.	Hard capsules – manufacturing of capsules (mixing, filling <i>etc</i> .), excipients, quality criteria of hard capsules. Quality control.	P. Kreutzwald
36.	Soft gelatin capsules – softgels. Excipients, manufacturing methods, quality criteria.	P. Kreutzwald
37.	Granules – classification by EP, definitions. Excipients. Manufacturing. Using purposes/possibilities. Quality control.	P. Kreutzwald
38.	Coating of solid formulations – purposes/possibilities for coating, materials and excipients of coatings. Coating processes – film-coating, sugar-coating. Methods of coating.	P. Kreutzwald
39.	Consultation for exam.	P. Kreutzwald, P. Veski

Laboratory work

Week	Торіс	Teacher
1.	Introduction. Definitions – aseptic work conditions, sterilization, chemical/physical stabilization of solutions <i>etc</i> .	P. Kreutzwald
2.	Isotonic solutions (injections, eyedrops) – methods for calculating of isotonic concentration. Methods of chemical stabilization of solutions – stabilization against hydrolysis and oxidation.	P. Kreutzwald
3.	Making of injections (vehicle, active ingredient(s), excipients, stabilization, sterilization by autoclave). Individual works.	P. Kreutzwald
4.	Making of injections (vehicle, active ingredient(s), excipients, stabilization, sterilization by autoclave). Individual works.	P. Kreutzwald
5.	Making of eyedrops (vehicle, active ingredient(s), excipients, stabilization, sterilization by autoclave). Individual works.	P. Kreutzwald
6.	Making of eyedrops (vehicle, active ingredient(s), excipients, stabilization, sterilization by autoclave). Individual works.	P. Kreutzwald
7.	Making of semisolid ophthalmic preparations - ointments, creams (different ointment bases, active ingredient(s), excipients, manufacturing methods). Individual works.	P. Kreutzwald
8.	TEST (theoretical and practical) – manufacturing of aseptic pharmaceutical formulations. 3 prescriptions.	P. Kreutzwald
9.	Seminar: manufacturing of different kind of dosage forms – powders, solutions, syrups, suspensions, emulsions, herbal drug preparations, semisolid preparations, suppo-sitories <i>etc.</i> Manufacturing methods, excipients. Discussion in groups.	P. Kreutzwald
10.	Making of different kind of dosage forms: powders, solutions. Individual works.	P. Kreutzwald
11.	Making of different kind of dosage forms: suspensions, emulsions, syrups. Individual works.	P. Kreutzwald
12.	Making of different kind of dosage forms: semisolid preparations (ointments, creams <i>etc.</i>), herbal drug preparations. Individual works.	P. Kreutzwald
13.	Making of different kind of dosage forms: aseptic pharmaceutical formulations, suppositories, globules. Individual works.	P. Kreutzwald
14.	Making of different kind of dosage forms: all kind of dosage forms. Individual works.	P. Kreutzwald
15.	TEST (theoretical and practical) – manufacturing of different kind of dosage forms. 3 prescriptions.	P. Kreutzwald
16.	Finishing of laboratory works. Preliminary exam.	P. Kreutzwald
24.	Seminar: Introduction. Introducing of practical works. Dilution of	P. Kreutzwald

	alcohol – calculations.	
2537.	Individual and group works – see list below!	P. Kreutzwald
38.	TEST (theoretical) – individual works, methods of extraction, manufacturing of herbal drug preparations, dilution of alcohol – calculations.	P. Kreutzwald
39.	Finishing of laboratory works.	P. Kreutzwald

a) Individual works

- * Determination of alcohol in herbal drug preparations by distillation.
- * Determination of alcohol in herbal drug preparations by boiling temperature.
- * Determination of alcohol in herbal drug preparations by oxidation.
- * Flowability of granules.
- * Determination of essential mustard oil in mustard plaster
- * Determination of iridoid glycosides (aucubine) in plantain (*Plantago major*)
- * Manufacturing of syrup from berries of wild rose (Sirupus Rosae)

* Determination of tannins in herbal drug preparations - in different tinctures and extracts – for example St. Johns wort (*Tinctura Hyperici*), Tormentil (*Tinctura Tormentillae*), Bistort (*Extractum Bistortae fluidum*), Guelder-rose (*Extractum Viburni fluidum*) etc.

* Determination of anthracene derivatives in liquid extract of Alder Buckthorn (*Extractum Frangulae fluidum*).

* Determination of of essential oils in dryied leaves of peppermint (Folium Menthae piperitae).

* Determination of glycyrrhizinic acid in dry extract of Liquorice (xtractum. Glycyrrhizae siccum).

* Preparation of soft extract of lingonberry (*Extractum vitis-idaeae spissum*) or <u>bearberry</u> (*Extractum Uvae ursi spissum*).

* Determination of arbutin in soft extract of lingonberry (*Extractum vitis-idaeae spissum*) or <u>bearberry</u> (*Extractum Uvae ursi spissum*).

b) Group works (2-3 students in groups) – each group makes and analyses during semester one herbal drug preparation (tincture or extract). List of herbal drug preparations:

- * Tinctura Tormentillae
- * Extractum Frangulae fluidum
- * Tinctura Calendulae
- * Extractum Urticae fluidum
- * Extractum Chamomillae fluidum
- * Biostimulator preparation of Aloe arborescens
- * Extractum Crataegi fluidum
- * Tinctura Hyperici
- * Tinctura Allii sativi
- * Tinctura Valerianae
- * Tinctura Convallariae
- * Tinctura Millefolii

Subtotal hours - 80

TOTAL HOURS -144 (+ individual work - 96 hours)

1. Identification

Name of Department. Department of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian: Physicochemical Analysis of Medicines Ravimite füsikokeemiline analüüsNational Credits (CP): 4ECTS Credits (CP): 6		Subject Code: ARFA.02.079	
Study Level (Name of Curriculum): L Pharmacy (3) V V		Location in (semesters VII	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: The aim of present course is to describe the physicochemical principles of the design of dosage and analytical techniques used to characterize physicochemical properties of ingredients. Brief Description of the Course (Annotation): The biopharmaceutical quality of medicines is highly dependent on the physicochemical properties of active substances and excipients. The present course concentrates to the teaching of physical characteristics of solid state. liquids and dispersions. The programme follows Martin's system and classification of physical analysis methods described in EP and USP. Languages of Teaching: Estonian Study Period (in weeks): 16 Lecturers: Peep Veski, Karin Kogermann, Andres Meos, Urve Paaver, Toivo Hinrikus Course Web Page: Not available. http://www.med.ut.ee/farmaatsia Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures 48 hours, seminars 48 hours, independent work 64 hours

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

16. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.

1. A. T. Florence and D. Attwood Physicochemical Principles of Pharmacy. Pharmaceutical Press, 2004.

M. E. Aulton Pharmaceutics. The science of dosage form design. Churchill-Livingstone, 2002.
 P. J. Sinko Martin's physical pharmacy and pharmaceutical sciences. Lippincott Williams & Wilkins.

4. A. Martin. Physical Pharmacy, 4th Edition, Williams & Wilkins, 1993

5.	European	Pharmacopoeia,	6th	Edition,	2007.
0			- ! -	0005	

6. Unites States Pharmacopoeia, 2005.

Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- I Teaching / learning materials to be distributed among students

Teaching / learning materials in Internet

Laboratory and technical equipment

Patients

5. Assessment

Way of Final Assessment

Contir	nuous asses	ssment
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Practical work or bedside evaluation

Written (test)

Written (essay)

🛛 Oral

Combination

Other

□ None

Composition of the Final Assessment (grade)

Qualification to the final assessment: participation in all seminars, essay + short presentation in seminar + discussion.

Final assessment: written exam, multiple choice questions + short essay questions + definitions.

Programme Lectures

Week	Торіс	Lecturer
1.	Chemical incompatibilities in pharmaceutical formulations	T. Hinrikus
2.	Physical incompatibilities in pharmaceutical formulations	T. Hinrikus
3.	Validation of analytical methods	A. Meos
4.	Vibrational Spectroscopy – IR, NIR, Raman, Terahertz pulsed spectroscopy	A. Meos
5.	Mass-spectrometry, Atomic Absorption Spectroscopy, Atomic Emission Spectroscopy, Atomic Fluorescence Spectroscopy, Capillary electrophoresis	A. Meos
6.	X-ray Analysis, X-ray Diffraction	T. Hinrikus
7.	Thermal Analysis: DSC, DTA, TGA, TMA, Karl Fisher Method	A. Meos
8.	Rheology. Theory. Liquids, dispersions, semisolids	U. Paaver
9.	Rheology and viscosity. Methods for determination of viscosities.	U. Paaver
10.	Colloids: kinetic properties, optical properties, electrical properties	U. Paaver
11.	Physical stability of dispersions	U. Paaver
12.	Amorphous solids. Crystalline solids. Polymorphism	K. Kogermann
13.	Hydrates and anhydrates. PAT and PIT	K. Kogermann

14.	Micromeritics. Density of solids: crystal density, particle density, bulk density, tapped density. Methods for determining density. Flow properties. Methods for determining flow properties	P. Veski
15.	Particle size. Laserdifractometry. Particle shape. Specific surface. Methods for determining particle size. Methods for determining surface area. Gas-adsorption method. Pore size. Porosity. Hg- porosimetry	P. Veski
16.	Solid interfaces. Wetting. Adsorption. Processes on the interfaces	P. Veski

Seminars

Week	Торіс	Teacher
1.	Factors influencing stability of drugs	T. Hinrikus
2.	Physical incompatibilities	T. Hinrikus
3.	Chemical incompatibilities	T. Hinrikus
4.	Physicochemical properties of solutions. Solubility of solid state in liquids. Factors influencing solubility	A. Meos
5.	Dissociation. pH and pKa. Ionic equilibria. Buffered and isotonic solutions	A. Meos
6.	Spectrophotometry. Vibrational spectroscopy	A. Meos
7.	Methods of thermal analysis	A. Meos
8.	Rheology. Viscosity. Determination of rheological characteristics.	U. Paaver
9.	Colloids. DDS. Classification. Properties of colloids	U. Paaver
10.	Stabilization of dispersions	U. Paaver
11.	Solubility of gases in liquids, blood and tissues	P. Veski
12.	Polymorphs. Methods for preparing different polymorphs	
		K. Kogermann
13.	Important physical characteristics of solid state	K. Kogermann
14.	Micromeritics	P. Veski
15.	Thermodynamics – main principles using in the design of formulations	P. Veski
16.	Conclusions	P. Veski

Subtotal hours 48

TOTAL HOURS 96.

1. Identification

Name of Department. Institute of Pharmacy			Code of Department. ARFA	
Course Title in English and Estonian: Biopharmaceutics (biofarmaatsia)			Subject Code: ARFA.02.049	
National Credits (CP):ECTS Credits (CP):34.5) <u>:</u>		
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 8	in Curriculum ərs):	

2. Brief Description

Objectives and Outcomes of the Course:

The course objective is to teach the fate of medicines in human body from viewpoint of the finished pharmaceutical products. As course outcome the pharmacy students know and critically analyze the relationship between the physicochemical properties of medicines and human pharmacokinetic data in the frame of their competence as pharmacists.

Brief Description of the Course (Annotation):

Biopharmacy investigates the factors influensing the action of medicines in human body (liberation, absorption, distribution, metabolism, and elimination of active pharmaceutical ingredient). The course of biopharmacy aims to integrate the contemporary information of formulations and the basic pharmacokinetics, i.e. it converts the drug into medicine. After completion of the course the pharmacy students can critically evaluate the physicochemical properties, the pharmacokinetic and pharmacodynamic data of registered medicines, describe the fundamental physiological and pathological variabilities underlying the therapeutic effect of administration of medicines, and promote the pharmaceutical care from the viewpoint of finished pharmaceutical product.

Languages of Teaching: Estonian

Study Period (in weeks): 16

Lecturers:

Prof. Peep Veski, sen. researcher Vallo Matto, assistant teacher Piret Kreutzwald

Course Web Page: http://www.med.ut.ee/150927

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures, practicals, seminars in total 78 hours plus independent work 42 hours

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

17. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.

Michael E. Aulton. Aulton's Pharmaceutics. The design and manufacture of medicines, 3rd ed. Churchill-Livingstone, Edinburgh, 2007 Leon Shargel, Susanna Wu-Pong, Andrew B. C. Yu. Applied Biopharmaceutics and Pharmacokinetics, 5th ed. McGraw-Hill, New York, 2005 Michael E. Burton [et al.]. Applied Pharmacokinetics & Pharmacodynamics. Principles of therapeutic drug monitoring. Lippincott Williams & Wilkins, Philadelphia [etc.], 2006 P. Langguth , G. Fricker, H. Wunderli-Allenspach. Biopharmazie. WILEY-VCH, Weinheim, 2004 [in German] Ю. Б. Белоусов, К. Г. Гуревич. Клиническая фармакокинетика. Практика дозирования лекарств. Littera, Москва, 2005 [in Russian]

Available teaching Resources

- I Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation
- Written (test)

Written	(essay)
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Oral

Combination

Other

None

Composition of the Final Assessment (grade)

Final assessment: multiple choice test + short essay questions, in total 100 points, exam result is graded according to the university general rules from F (insufficient, failed) to A (excellent, passed) Prerequisites to complete the course and qualification criteria to participate in the exam: written intermediate test passed, participation in all practicals and seminars

Programme Lectures

Week	Торіс	Lecturer
1.	Biopharmacy, pharmacokinetics, pharmacodynamics,	P. Veski
	toxicokinetics. History and development of biopharmacy,	
	contemporary challenges in biopharmaceutical sciences.	
	Definitions of liberation, absorption, distribution, metabolism,	
	excretion, and response. Role of biopharmacy in the context of	
	pharmaceutical technology and medicine, biopharmacy and the	

	related pharmaceutical and medical sciences. Description of the aims of the course outline, group and individual work as well as prerequisites and formal criteria to pass the final examination.	
1.	Bioavailability and bioequivalences. Definition of AUC, Cmax, tmax etc. Estimation of bioavailability and bioequivalence from practical, statistical, and regulatory point of view. EMEA and FDA guidelines for bioequivalences. Critical evaluation of bioequivalence data.	V. Matto
2.	Liberation of active pharmaceutical ingredient from conventional and unconventional formulations. Distinct kinetical patterns of liberation. Methodology and protocols of liberation estimation. Biopharmaceutical classification system. In vitro-In vivo correlations: definitions, examples, critical analysis of data	P. Kreutzwald
2.	Physiological processes of active pharmaceutical ingredient in human body: anatomy, histology, physiology, and pathophysiology. Passive and active transportation, definitions, examples, exceptions, physiological and pathological influences of active pharmaceutical ingredient transportation across the body's functional barriers. Paracellular and transcellular, receptor mediated etc. transportation. Various diffusion processes of active pharmaceutical ingredient across the body barrier. Basics of the Michaelis-Menten kinetics for absorption. Absorption of active pharmaceutical ingredient from the gastrointestinal tract.	V. Matto
3.	Distribution mechanisms and kinetics of active pharmaceutical ingredient in human body. Metabolism of active pharmaceutical ingredient, various enzyme systems and their regulation. Specific emphasis on CYP450 system, inhibition and induction of CYP450 enzymes. 1 st and 2 nd phase metabolic reactions, their regulation. Pharmacokinetic analysis of non-compartment and compartment models, relevance to applied pharmacokinetics	V. Matto
3.	Excretion of active pharmaceutical ingredient. Role of kidneys. Main physiological and pathological factors influencing excretion Basic pharmacokinetic characteristics: definitions, explanations, examples, clinical applications. AUC calculation using trapezoidal rule.	V. Matto
5.	Absorption of active pharmaceutical ingredient from mouth, nose, lungs, and skin. Anatomy, physiology, and pahtologies of those organs. Mechanisms of absorption, examples, bioavailability comparisons. Clinical application of extraoral and extravasal administration.	V. Matto
6.	Physicochemical properties of active pharmaceutical ingredient, pKa value, pH participation theory, exceptions from the pH participation theory. TPC and APC.	P. Kreutzwald
6.	Importance of the physicochemical properties of active pharmaceutical ingredient in biopharmacy: dissolution and solubility, properties of solutions, surface and interfacial phenomena, particle size, polymorphism and pseudo- polymorphism, Noyes-Whitney theory.	P. Kreutzwald
7.	Pharmaceutical preformulation. Role of various salts of active pharmaceutical ingredient in the biopharmacy.	P. Kreutzwald
7.	Role of physiological factors and pathological conditions on the pharmacokinetics of active pharmaceutical ingredient. Biopharmaceutical aspects of peroral formulations: influencing factors, variability among patients.	V. Matto
8.	Correlation of pharmacokinetics and pharmacodynamics. Description and clinical application of various PK/PD models. Population pharmacokinetics: definition and description. Inter- and intra-subject variability of pharmacokinetic data. Therapeutic drug monitoring.	V. Matto

8.	Pharmacokinetics in children and aged population. Clinical	V. Matto /
	consequences of age on pharmacokinetic parameters. Food-	P. Veski
	drug interactions and pharmacokinetic and pharmacodynamic	
	changes of therapeutic effect.	

Seminars

Week	Торіс	Teacher
4.	1 st group: Discussion of main pharmacokinetic parameters. Practical calculation of AUC using the trapezoidal rule. 2 nd group: Analysis of a pharmacokinetic data containing research article (article in English, if necessary, explanation of English language terminology)	V. Matto
4.	<i>Vice versa</i> 2 nd group: Discussion of main pharmacokinetic parameters. Practical calculation of AUC using the trapezoidal rule. 1 st group: Analysis of a pharmacokinetic data containing research article (article in English, if necessary, explanation of English language terminology)	V. Matto
5.	All groups: general discussion of the pharmacokinetic data containing research article from the previous seminar. The students discuss how they can implement the pharmacokinetic data in their future work as pharmacists. PubMed search for similar articles. Cross-referencing. Evidence based and biased pharmacokinetic data.	V. Matto
12.	Conventional versus non-conventional formulations: Discussion in groups, analysis of provided seminar materials).	P. Kreutzwald
13.	Biopharmaceutical aspects of intraoral and intranasal formulations: discussion in groups: analysis of pharmacokinetic data of registered formulations using Pharmaca Estica. Individual work using provided seminar materials.	V. Matto
14.	Biopharmaceutical aspects of transdermal formulations: discussion in groups: analysis of pharmacokinetic data of registered formulations using Pharmaca Estica. Individual work using provided seminar materials.	V. Matto
15.	Biopharmaceutical aspects of formulations for pulmonary delivery: discussion in groups: analysis of pharmacokinetic data of registered formulations using Pharmaca Estica. Individual work using provided seminar materials.	V. Matto
16.	Preparation for final assessment (exam) (optional, not mandatory!), if necessary repetition of the mandatory intermediate test.	P. Kreutzwald/ P. Veski
16.	Pre-exam consultation. The teachers answer questions on the biopharmacy course (optional, not mandatory!)	P. Veski/ V. Matto/ P. Kreutzwald

Subtotal hours 21 + optional 6 for pre-exam preparation and consultation

Laboratory work

Week	Торіс	Teacher
910.	Practical work on dissolution test in groups. The students will be	P. Kreutzwald/
	given individual work/obligations regarding preparation,	V. Matto
	performing, data collection, and data analysis and interpretation	
	of the dissolution test using the Sotax 7 dissolution apparatus.	
	Various changes in dissolution protocols are demonstrated by	
	the teachers and repeated by the students. All students	
	mandatory have to participate in the hand-on work. Each student	
	has to work in dissolution laboratory under supervision of the	

	teacher for 12 hours.	
11.	Preparation for mandatory intermediate test	P. Kreutzwald
11.	Mandatory intermediate test	P. Kreutzwald

TOTAL HOURS 78 + 42 independent work = 120

1. Identification

Name of Department: Institute of Pharmacy		Code of Department. ARFA
Course Title in English and Estonian: Social Pharmacy, sotsiaalfarmaatsia		Subject Code: ARFA.01.044
National Credits (CP):ECTS Credits (CP):34.5		
Study Level (Name of Curriculum): Pharmacy		ntion in Curriculum nesters):

2. Brief Description

Objectives and Outcomes of the Course: Introduction of different aspects (legal, economical, ethical, political, social, psychological, behavioral) of medicinal products, to support safe and effective drug treatment.

Brief Description of the Course (Annotation):

Social pharmacy is a relatively recent and independent scientific concept, which is contributed by sociology, politics, psychology and economics. Social pharmacy has developed as hybrid: drawing on methodologies and theories from the social and behavioural sciences in order to explore a diverse range of topics within pharmacy practice. The main study topics are legal, ethical, economical, political, social, behavioural and psychological aspects of medicinal products. In general social pharmacy supports safe and rational drug consumption.

Languages of Teaching: Estonian

Study Period (in weeks): 16

Lecturers: Daisy Volmer, Peeter Villako

Course Web Page: Not available.

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures 32 hours seminars 40 hours, independent work.

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

18. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.

1. Tindall W, Breadsley RS, Kimberlin CL (2003). Communication Skills in Pharmacy Practice, 4th ed.

Lippincott Williams & Wilkins, Philadelphia (etc.). 2. Malone PM et al. (2001). Drug Information, 2nd ed. McGraw-Hill, New York (etc.).

3. Bisell P, Traulsen JM (2005). Sociology and Pharmacy Practice. Pharmaceutical Press, London, Chicago.

4. Rovers JP (2003). A Practical Guide to Pharmaceutical Care, 2nd ed. American Pharmaceutical Association.

5. Harman RJ, Mason P (2002). Handbook of Pharmacy Healthcare, 2nd ed. Pharmaceutical Press, London, Chicago.

Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students

Teaching / learning materials in Internet

Laboratory and technical equipment

Patients

5. Assessment

Way of Final Assessment

Continuous assessr

- Practical work or bedside evaluation
- Written (test)

Written (essay)

- Oral
- Combination
- Other

□ None

Composition of the Final Assessment (grade)

Qualification to the final assessment: participation in all seminars, completing of oral and written assignments.

Final assessment: written exam, multiple choice questions (20 points) + short essay questions (20 points). Exam result is graded according to the Study Regulations of University of Tartu: E to A is regarded as pass and F is regarded as failure.

Programme Lectures

Week	Торіс	Lecturer
1.	Health (definitions, health indicators, public health, health promotion, health education and the role of pharmacist in health education, models of health care systems), and illness (definitions, pathological and statistical model, sick role, social distribution of illness, public perception of health care services in Estonia)	D.Volmer
2.	Profession of pharmacist (definitions, professional standards and register of pharmacist and assistant pharmacists in Estonia, professional activities of pharmacists in ambulatory and hospital	D.Volmer

	care)	
3.	Medicine, prescribing and consumption of medicines (definition of medicine and active ingredient; drug market in Baltic countries; functions of medicines for patient, physician, pharmacist and society; prescribing of medicines; physician and drug information; model of drug consumption; factors influence drug consumption; drug consumption problems)	D.Volmer
4.	event, side effect, medication error; description of side effect types; interactions; drug interventions at pharmacy; role of pharmacist in prevention and identification of prescription errors)	
5.	Social pharmacy, clinical pharmacy, pharmaceutical care (definitions; history of social pharmacy; description of clinical pharmacy and pharmaceutical care activities; problems in implementation of pharmaceutical care into practice; Finnish and Latvian samples)	D.Volmer
6.	Ethics, business ethics, medical ethics (definitions; samples of problems in medical ethics; informed consent; ethical dilemmas in community pharmacy practice; principles of justice in health care)	D.Volmer
7.	Introduction to human psychology, lay attitudes and behaviour, communication, empathy (definitions; personality in psychology; self-efficiency; temperament; emotions; drug compliance; concordance; communication models; communication stages; empathy in communication)	D.Volmer
8.	Drug communication at pharmacy, communication between pharmacist and physician (reasons for drug counselling; counselling of different social groups – children, elderly, patients with chronic conditions etc.; drug communication stages; communication barriers; reasons for communication between physician and pharmacist)	D.Volmer
9.	Introduction to Medication Review (drug related problems in elderly and patients with chronic conditions; polypharmacy; promotion of rational use of medicines; samples of medication review initiatives; collaboration of health care providers)	D. Volmer
10.	Drug information, drug promotion, drug advertisement (definitions; history of drug information; drug information sources for health care providers and patients; drug information of prescription medicines and OTC medicines; drug information in the Internet; regulations in drug advertisement)	D.Volmer
11.	Pharmacy sector in health care system (types of pharmacies, indicators of pharmacies, e-pharmacies, digital prescription)	D.Volmer
12.	Drug policy (drug policy in EU countries – similarities and differences in comparison with Estonia; recent changes in pharmacy legislation in Estonia)	D.Volmer
13.	Marketing (definitions, philosophy, trade marketing, service marketing, product marketing; planning of marketing; marketing communication)	P. Villako
14.	Trade marketing (description of activities; definition of marketing mix – product, price, place, promotion)	P. Villako
15.	Behaviour of customer, sale and service (definitions, drug promotion, sales promotion, customer satisfaction)	P. Villako
16.	Medicinal marketing. Pharmacy marketing (from idea to the result: new drug; new service – main purposes, long-time purposes; planning of strategies)	P. Villako

Subtotal hours 32.

Seminars

Week	Торіс	Teacher
1.	Health and illness, discussion in groups	D. Volmer
2.	Lay perception concerning pharmacist (individual questioning of	D. Volmer
	one person before seminar; discussion in groups)	
	Evaluation of pharmacy profession and pharmacy studies by	
	pharmacy student (completing questionnaire in seminar and	
	discussion in groups)	D \ (
3.	Drug consumption by the sample of one household (individual	D. Volmer
	questioning of one person before seminar; discussion in groups)	D \/alman
4.	Side effects and interactions of medicines (case studies, discussion in	D. voimer
	groups, presentation of the results by role play: pharmacist-pharmacy	
	customer/patient)	
	Introduction of drug interaction database for Estonian community	
5	Clinical pharmacy practice (case studies: pain treatment	
0.	diabetes asthma: discussion in groups presentation of the	
	results)	
6.	Ethical and critical situations in community pharmacy (case	D. Volmer
	studies, discussion in groups, presentation of the results by role	
	play: pharmacist-pharmacy customer/patient)	
7.	Knowledge in human psychology, communication, self-	
	examination tests.	5.11
	Pharmacy customers with different temperament types,	D. Volmer
	discussion in groups; presentation of the results by role play:	
0	Solf modiaction (individual quastioning of three persons before	
0.	seminar: discussion in groups: case studies of self treatment	D. Voimer
	sounselling at phermacy discussion in groups, presentation of the	
	results by role play: pharmacist-pharmacy customer/patient	
9	Drug information to the pharmacy customer (case studies of	
0.	prescription medicines and OTC medicines discussion in groups	D Volmer
	presentation of the results by role play pharmacist-pharmacy	21.10
	customer/patient)	
	Search of medical information (basic info concerning minor illnesses)	
	from the Internet (discussion in groups)	
10.	Medication Review in case of polypharmacy (case studies,	D. Volmer
	discussion in groups)	
11.	Pharmacy and drug related home pages in the Internet, e-	D. Volmer
	pharmacies, (discussion in groups)	
	Visit to State Agency of Medicines	
12.	Drug advertisement, (individual evaluation of one drug advertisement	
	- prescription or OTC medicine, discussion in groups)	D. Volmer
13.	Analysis of marketing strategies of one pharmacy (discussion in	P. Villako
	groups)	
	Drawing up a business plan of pharmacy (discussion in groups)	

Subtotal hours 40. TOTAL HOURS 72.

1. Identification

Name of Department. Department of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian: Pharmacy Practice Apteegipraktika			Subject Code: ARFA.02.071
National Credits (CP): 25	ECTS Credits (CP,): 37.5	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 10	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: The aim of the pharmacy practice is to implement theoretical knowledge and to receive the practical skills.
Brief Description of the Course (Annotation): Pharmacy practice (25 CP/37.5 ECTS) takes place in the 5th year of studies in the period from December to June. (The aim of the pharmacy practice is to implement theoretical knowledge and to receive the practical skills.)
The practical training is mainly organised in the community pharmacies of Tartu University, but also in the other Estonian pharmacies suitable for practice. Partly (maximum for 3 months), the practice is undertaken in the hospital pharmacies.
A supervisor coordinating the student's activities in the pharmacy is appointed. During the practice the student acquires the skills necessary for all fields of work in the pharmacy. The medicinal products (prescription medicines and OTC medicines), food supplements and natural products delivered by pharmacy are introduced to the students in the practice period
 During the practice in the community pharmacy, the students acquire sufficient knowledge of: The evaluation of prescriptions and check-up of prescribed doses; The storage of medicinal products in the pharmacy; The communication skills with the patients; The account of tangible assets (fixed assets, current assets, commodities, tare, packaging, etc.); The taxation and documents; The accounting in pharmacies (monthly, guarterly and annual) the require reports
In the pharmacy different dosage forms (powders, solutions, suspensions, emulsions, creams, pastes, gels) are prepared and documented.
The report is drawn up and submitted to the Department of Pharmacy by the student at the end of the practice.
During the pharmacy practice students have to focus on counselling of pharmacy customers. They have to record 5 cases both of counselling of prescription and OTC medicines and 10 cases for counselling of self-medication.
Languages of Teaching: Estonian
Study Period (in weeks): 25 weeks

Lecturers:

Maaja Paavo (responsible), Tea-Mai Tammaru

Course Web Page:

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Practical work 600 h

3. Course Structure and Content

Not applicable

19. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix. Pharmaca Estica. Tartu, OÜ Pharmaca Estica, 2007 [in Estonian]

Martindale: The Complete Drug Reference, 35th ed. vol 1, 2. London, Chicago, Pharmaceutical Press, 2007

Roger Walker, Clive Edwards. Clinical Pharmacy and Therapeutics, 3rd ed. Edinburgh [etc.], Churchill Livingstone, 2003

Michael E. Aulton. Aulton's Pharmaceutics. The design and manufacture of medicines, 3rd ed. Edinburgh [etc.], Churchill-Livingstone, 2007

http://www.sam.ee (Register of human medicines) Available teaching Resources

- I Teaching materials for lecture / classroom demonstration
- \boxtimes \square Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- □ Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment
🖂 🔲 Continuous assessment
Practical work or bedside evaluation
⊠ □ Written (test)
🖂 🗌 Written (essay)
☐ Other

None

Composition of the Final Assessment (grade)

Grade "pass" is given if the student shows that he/she has acquired the knowledge, skills and competences required in the subject syllabus.

1. Identification

Name of Department. Institute of Pharmacy		Code of Department. ARFA
Course Title in English and Estonian:		Subject Code:
Pharmaceutical commodities		ARFA.02.044
National Credits (CP):	ECTS Credits (CP):	
3	4.5	
Study Level (Name of Curriculum):	Locati	on in Curriculum
Pharmacy	(seme 10	sters):

2. Brief Description

Objectives and Outcomes of the Course: Introduction of pharmacy students to medicines that are included in Estonian register of medicinal products for human use. Students that pass the course should have good knowledge in medicines available in Estonian pharmacies.

Brief Description of the Course (Annotation):

Subject "Pharmaceutical commodities" deals with the medicines, officially permitted for human use in Estonia. The course is based on biannually issued reference book "Pharmaca Estica" that presents current official Estonian registry of medicines and comprehensive physician oriented monographs for most of the registered medicines. The pharmaceuticals dealt with during the course are grouped accordingly to the ATC-classification, i.e. mainly by their therapeutic properties. The aim of the subject is to introduce the trade names of pharmaceuticals to students. Aside of that, one must know the INN-name of the medicine, the basics of its mechanism of action, indications and dosages. The course lasts one term, lessons are held in the form of workgroup, the students can handle medicines or see the pictures of packages. Students that pass the course should have good knowledge in medicines available in Estonian pharmacies.

Languages of Teaching: Estonian

Study Period (in weeks): 16

Lecturers: Andres Meos

Course Web Page:

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Seminars 72 hours

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

20. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and

, ,, ,, ,, ,,	available at the in	stitute's library	v are given	in the	separate	appendix.
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Pharmaca Estica 2007/2008. OÜ Pharmaca Estica, Tartu, 2007, 1687 pp Allikmets, L., Nurmand, L. Farmakoloogia. TÜ Kirjastus, Tartu, 1996, 668 pp Rang, H.P. et al. Pharmacology, 5th ed. Churchill Livingstone, 2003, 797 pp Waller, D.G., Renwick, A.G., Hillier, K. Medical Pharmacology and Therapeutics, 2nd ed. Elsevier, 2005, 778 pp

Harkevitsh, D.A. Farmakologija. Moskva, GEOTAR-Media, 2005, 735 pp

Available teaching Resources

- \boxtimes Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment

Practical work or bedside evaluation

Written (test)

Written (essay)

- 🗌 Oral
- Combination
- Other
- None

Composition of the Final Assessment (grade)

Qualification to the final assessment: participation in seminars. Final assessment: graded written exam, 20 short essay questions. One question is worth one point, minimum number of points for passing the examination is 11 (~55%).

Programme

Seminars

Week	Торіс	Teacher
1.	Stomatological preparations, Drugs for acid related disorders, Drugs for functional gastrointestinal disorders, Antiemetics and antinauseants, Laxatives, Antidiarrheals, Intestinal anti- inflammatory/anti-infective agents, Antiobesity preparations, excluding diet products	A. Meos
2	Digestives, including enzymes, Drugs used in diabetes, Vitamins, Mineral supplements, Tonics, Anabolic agents for systemic use, Other alimentary tract and metabolism products, Antithrombotic agents, Antihemorrhagics, Antianemic preparations	A. Meos
3.	Blood substitutes and perfusion solutions, Cardiac therapy	A. Meos
4.	Antihypertensives, Diuretics, Peripheral vasodilators,	A. Meos

	Vasoprotectives, Beta blocking agents, Calcium channel blockers	
5.	Agents acting on the renin-angiotensin system, Lipid modifying agents, Antifungals for dermatological use, Emollients and protectives, Preparations for treatment of wounds and ulcers, Antipruritics, including antihistamines, anesthetics, etc., Antipsoriatics	A. Meos
6.	Antibiotics and chemotherapeutics for dermatological use, Corticosteroids, dermatological preparations, Antiseptics and disinfectants, Anti-acne preparations, Other dermatological preparations, Gynecological anti-infectives and antiseptics	A. Meos
7.	Sex hormones and modulators of the genital system, Urologicals, Pituitary and hypothalamic hormones and analogues, Corticosteroids for systemic use	A. Meos
8.	Thyroid therapy, Pancreatic hormones, Tetracyclines, Penicillins, Other beta-lactam antibiotics	A. Meos
9.	Sulphonamides and trimethoprim, Macrolides, Aminoglycosides, Derivatives of cinoline, Other antibacterials, Antimycotics for systemic use, Antimycobacterials, Antivirals for systemic use	A. Meos
10.	Immune sera and immunoglobulins, Vaccines, Antineoplastic agents	A. Meos
11.	Endocrine therapy, Immunostimulants, Immunosuppressive agents, Anti-inflammatory and antirheumatic products	A. Meos
12.	Topical products for joint and muscular pain, Muscle relaxants, Antigout preparations, Drugs for treatment of bone diseases, Anesthetics	A. Meos
13.	Analgesics, Antiepileptics, Anti-parkinson drugs	A. Meos
14.	Psycholeptics, Psychoanaleptics, Other nervous system drugs, Antiparasitic products, insecticides and repellents	A. Meos
15.	Nasal preparations, Throat preparations, Drugs for obstructive airway diseases, Cough and cold preparations, Antihistamines for systemic use	A. Meos
16.	Ophthalmological and otological preparations, various	A. Meos

Subtotal hours 72

TOTAL HOURS 72 + 48 independent work = 120

1. Identification

Name of Department:			Code of Department.
Department of Fhamacy			ANFA
Course Title in English and Estonian:			Subject Code:
Designing of research work			ARFA.02.040
Uurimistöö planeerimine			
National Credits (CP):	ECTS Credits (CP).	
0.5	0.75		
Study Level (Name of Curriculum):		Location in	Curriculum
Pharmacy		(semesters):
		•	ÎX

2. Brief Description

Objectives and Outcomes of the Course:
To describe and analyse the most important and relevant experiences of the research work
Brief Description of the Course (Annotation):
Introductional lectures of the research work
Languages of Teaching:
Estonian
Study Period (in weeks):
3 weeks
Lecturers:
Toivo Hinrikus
Course Web Page:
Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)
Lectures

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

21. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix. Viru, A. Teadustöö alused. Tartu Ülikool, Tartu, 1993 Kõverjalg, A. Teadustöö metoodika alused. Tallinn, 1993. Lauk, E. Algteadmisi teadustööst Tartu, 1995. Kalle, E., Aarma, A. Teadustöö alused. Tallinna Tehnika Ülikool, Tallinn, 2003. Kõverjalg, A. Üliõpilastööde koostamise metoodika. Sisekaitseakadeemia, Tallinn, 2003. Uuspõld, E. Üliõpilastööde vormistamise juhend. Tartu Ülikool, Tartu, 2004. Hinrikus, T., Veski, P., Meos, A. Proviisoriõppe üliõpilaste uurimistööde vormistamine. Tartu Ülikool, Tartu, 2008. Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation

Composition of the Final Assessment (grade)

Prerequisite to complete the course is participation in all lectures.

Programme Lectures

Week	Торіс	Lecturer
1.	Research, research work (definitions, content, history).	T. Hinrikus
2.	Steps of research work.	T. Hinrikus
3.	Formulation of results of research work.	T. Hinrikus

TOTAL HOURS 12

1. Identification

Name of Department: Department of Pharmacy			Code of Department: ARFA
Course Title in English and Estonian: Research Seminar			Subject Code:
National Credits (CP): 2	ECTS Credits (CP) 3):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 9	Curriculum):

2. Brief Description

Objectives and Outcomes of the Cours	se:			
The aims of the course are to increase the knowledge about planning, performing a study, reporting				
and presenting the results of the study (research work).				
Brief Description of the Course (Annot	ation):			
In these seminars are dealing with scie	ence-based planning and performing of research project.			
Concrete topics of the seminar depend	d on the topic of the research project.			
Languages of Teaching:				
Estonian				
Study Period (in weeks):				
14 weeks				
Lecturers:				
Supervisors of the research work				
Course Web Page:				
Work Volumes and Formats (lectures,	, practicals, seminars, colloquia, e-learning, independent work)			
48 hours seminars, 32 hours independ	lent work			
	the second se			
In the Department of Pharmacy Researce	ch Work is performed during 9 th semester in following subjects:			
Biopnarmaceutics	ARFA.02.041 Research Seminar in Biopharmaceutics			
Pharmaceutical Management	ARFA.01.039 Research Seminar in Pharmaceutical			
	ADEA 04 044 Dessent Comisser in Dhamasaan			
Pharmacognosy	ARFA.01.041 Research Seminar in Pharmacognosy			
Pharmaceutical Chemistry	ARFA.02.043 Research Seminar in Pharmaceutical			
Pharmaceutical Lechnology	ARFA.02.042 Research Seminar in Pharmaceutical			
I ecnnology				
Phytochemistry	ARFA.01.040 Research Seminar in Phytochemistry			
Social Pharmacy	ARFA,01.038 Research Seminar in Social Pharmacy			
History of Pharmacy	ARFA.02.101 Research Seminar in History of Pharmacy			

1. Identification

Name of Department: Department of Pharmacy			Code of Department. ARFA
<i>Course Title in English and Estonian</i> : Research Work			Subject Code: ARFA.00.054
National Credits (CP): 7.5	ECTS Credits (CP, 11.25):	
<i>Study Level (Name of Curriculum):</i> Pharmacy		Location in (semesters 9	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course:
Planning and performing research work. Writing the thesis and public commencement of the thesis
Brief Description of the Course (Annotation):
In the Department of Pharmacy Research Work is performed during 9 th semester in following
subjects: biopharmaceutics, pharmaceutical technology, pharmaceutical chemistry, social pharmacy,
pharmaceutical management, pharmacognosy, phytochemistry, history of pharmacy.
Languages of Teaching:
Estonian
Study Period (in weeks):
14 weeks
Lecturers:
Supervisors: all the academic staff of the Department of Pharmacy. Commissions for commencement
of the thesis is appointed on the basis of proposal of the Head of the Department of Pharmacy by
Dean of the Faculty of Medicine
Course Web Page:
Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) 300 hours: literature + research work + writing the thesis + public commencement of the thesis

1. Identification

Name of Department: Department of Pharmacy			Code of Department. ARFA
<i>Course Title in English and Estonian</i> : Final Exam Lõpueksam			Subject Code: ARFA.02.060
National Credits (CP): 2	ECTS Credits (CP): 3		
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 10	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course:
Brief Description of the Course (Annotation):
Final Exam consists of 160 multiple choice questions. The proportion of questions:
 pharmaceutical technology – 44
 pharmaceutical chemistry – 30
 social pharmacy and pharmaceutical management – 25
- pharmacognosy – 25
- pharmacology and pharmacotherapy - 36
Languages of Teaching:
Estonian
Study Period (in weeks):
Lecturers:
Commission of the final exam appointed by the Dean of the Faculty of Medicine
Course Web Page:
Concrete topics from different field in web page of the Department of Pharmacy 6 months before
exam
Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)
Exam – 5 hours, independent work - 75 hours

1. Identification

Name of Department: Institute of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian: Pharmacognosy I (Farmakognoosia I)			Subject Code: 01.072
National Credits (CP): 2	ECTS Credits (CP) 3):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters II	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course:

To obtain general knowledge about plant anatomy, morphology and ecology; to clarify connections between medicinal plants and plant communities; to introduce cultivation possibilities of medicinal plants.

To be able to know Estonian native medicinal plants and to identify unknown (medicinal) plants. Brief Description of the Course (Annotation):

Anatomy, morphology and ecological connections between plants and environment are discussed. Medicinal plants growing in local plant communities are presented. A short overview about cultivation possibilities of medicinal plants is given. The systematics, compile of herbarium and use of plantkey are clarified.

Languages of Teaching: In Estonian

Study Period (in weeks): 16 weeks (24 – 39 weeks)

Lecturers: Ph.D. Ulve Pihlik

Course Web Page:

-

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures and seminars

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

22. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix. Kalda, A. et al.. Botaanika I. Tallinn, Valgus, 1965 (in Estonian). Eichwald, K. et al.. Botaanika II. Tallinn, Valgus, 1970 (in Estonian). Masing, V. Botaanika III. Tallinn, Valgus, 1979 (in Estonian). Kukk, T. Soontaimede anatoomia väike praktikum. Tartu, TÜ Kirjastus, 1996 (in Estonian). Kukk, T. Eesti taimede kukeaabits. Tallinn, Varrak, 2004 (in Estonian). Kukk, Ü. Eesti kaitstavad taimeliigid. Tartu, HUMA, 1999 (in Estonian). Leht, M. et al.. Eesti taimede määraja. Teine, parandatud ja täiendatud trükk. Tartu, Eesti Loodusfoto, 2007 (in Estonian).

Available teaching Resources

- Teaching materials for lecture / classroom demonstration
- Teaching / learning materials to be distributed among students
- Teaching / learning materials in Internet
- Laboratory and technical equipment
- Patients

5. Assessment

Way of Final Assessment

- Continuous assessment
- Practical work or bedside evaluation
- Written (test)
- Written (essay)
- 🛛 Oral
- Combination
- Other
- None

Composition of the Final Assessment (grade)

3 preceding tests and final test (all in written form) and identification of live medicinal plants (oral).

Programme Lectures

Week	Торіс	Lecturer
1.	Conception and object of botany, short overview of botanical history. System of plants.	U. Pihlik
2.	Plant cell (main terms, main parts of cell, nucleus, cell membrane, storage substances).	U. Pihlik
3.	Conceptions of plant anatomy and plant morphology. Plant tissues (classification and tasks).	U. Pihlik
4.	Root (classification, construction, modifications, use). Root system.	U. Pihlik
5.	Stem (types, branching, construction, modifications, use).	U. Pihlik
6.	Leaf (development, leaf skeletonizing, fissuring, simple and compound leaves, different types, modifications, use).	U. Pihlik
7.	Flower and inflorescence (types and construction). Blooming and fertilization. Use.	U. Pihlik
8.	Fruit and seed (construction, classification, distribution,	U. Pihlik

	germination, use).	
9.	Main terms of ecology. Ecological factors (radiation,	U. Pihlik
	temperature, water, soil, air).	
10.	Plant phenology. Area of species.	U. Pihlik
11.	Vegetation (components, relations between plants, relations	U. Pihlik
	between plants and pollinators, human influence).	
12.	Plant community (main characteristics, composition and	U. Pihlik
	structure). Medicinal plants in local plant communities.	
13.	Cultivation of medicinal plants. Soil (characteristics, main types,	U. Pihlik
	cultivation). Seeds (preserving, sowing). Growing, transplanting	
	and care of plants.	
14.	Plant systematics, nomenclature. More essential plant families.	U. Pihlik
15.	Make clear compile of herbarium and use of taxonomic guide for	U. Pihlik
	the identification of plants (plantkey).	
16.	Identification of (medicinal) plants.	U. Pihlik

Subtotal hours 32

Seminars

Week	Торіс	Teacher
	To study, get to know and identify medicinal plants in the field collection.	U. Pihlik

Subtotal hours 8

TOTAL HOURS 40 + independent work 40 hours

1. Identification

Name of Department. Institute of Pharmacy			Code of Department. ARFA
<i>Course Title in English and Estonian</i> : Analytical chemistry			Subject Code: ARFA.02.099
National Credits (CP): 7	ECTS Credits (CP): 10.5		
Study Level (Name of Curriculum): Pharmacy		Location in Curriculum (semesters): 2, 3	

2. Brief Description

Objectives and Outcomes of the Course: Introductory course to basic methods of analytical chemistry biased to quantitative analysis. Methods like gravimetry, volumetry (acid-base titrations, redox titrations, complexometry, precipitation titrations) and instrumental analysis (electrochemical methods, optical methods, chromatography) are dealt with.

Brief Description of the Course (Annotation):

Pharmacy students are introduced to fundamentals of analytical chemistry starting with purity of substance, laboratory equipment, basic data analysis, properties of solvents, chemical equilibrium, dissociation and solubility. Sample of systematic qualitative analysis of cations based on formation of precipitates with acids and bases is presented. Methods of quantitative analysis based on titration and optical properties of substances are more thoroughly dealt with. Basics of electrochemical methods of end-point detection and voltammetry as well as methods based on separation like chromatography are also presented.

Languages of Teaching: Estonian

Study Period (in weeks): 21

Lecturers: Andres Meos

Course Web Page: http://www.ut.ee/ARFA/OPPMAT.HTM

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures 42 hours, practicals 84 hours, seminars 14

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

23. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and

available at the institute's library are given in the separate appendix.

A. Meos. Farmatseutiline analüüs. Tartu 2008.

H. Kuus. Analüütiline keemia. Kvalitatiivne analüüs. Valgus, 1990.

H. Hödrejärv. Kvantitatiivne keemiline analüüs. TPÜ Kirjastus, 2000. D.C. Harris. Quantitative chemical analysis. 6th ed. W.H. Freeman and Co, 2003.

Аналитическая химия. Под ред. А.А. Ищенко. Москва, Academia, 2004.

Available teaching Resources

Teaching materials for lecture / classroom demonstration

Teaching / learning materials to be distributed among students

Teaching / learning materials in Internet

Laboratory and technical equipment

Patients

5. Assessment

Way of Final Assessment

\boxtimes	Continuous	assessment
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Practical work or bedside evaluation

Written (test)

Written (essay)

Oral

Combination

Other

□ None

Composition of the Final Assesment (grade)

Qualification to the final assessment: completing of all practicals and written tests. Final assessment: two graded written exams, one in the end of 2. semester (16 weeks) and the other in 3. semester (5 weeks). Questions consist of 10 calculations and of 70 questions (both multiple choice and short essay), first exam and 15 calculations and 15 questions, second exam. One calculation or question is worth one point, percentage for passing the examination is 51.

Programme

Lectures

Week	Торіс	Lecturer
1.	Introduction to analytical chemistry, analytical properties of a	A. Meos
	substance, chemical reactives and laboratory equipment	
2	Statistical analysis of experimental data	A. Meos
3.	Systematic quantitative analysis of cations	A. Meos
4.	Law of mass action and chemical equilibrium	A. Meos
5.	Solutions, water as a solvent, autoprotolysis of water	A. Meos
6.	Solutions of strong and weak acids and bases, dissociation	A. Meos
	constants, buffers	
7.	Solubility product, molar solubility, gravimetric analysis	A. Meos
8.	Volumetric analysis, chemical concentrations	A. Meos
9.	Acid-base titrations	A. Meos

10.	Redox titrations	A. Meos
11.	Complexometric titrations	A. Meos
12.	Precipitation titrations	A. Meos
13.	Electrochemical methods, potentiometry, amperometry,	A. Meos
	conductometry	
14.	Voltammetry	A. Meos
15.	Optical methods, refractometry, polarimetry	A. Meos
16.	UV/Vis spectrophotometry	A. Meos
17	IR-Spectrophotometry	A. Meos
18	Fluorometry, atomic absorption spectrophotometry	A. Meos
19	Introduction to chromatography	A. Meos
20	Gas chromatography, liquid chromatography	A. Meos
21	HPLC methodology	A. Meos

Subtotal hours 42

Practicals

Week	Торіс	Teacher
1.	Qualitative analysis of cations (one cation)	A. Meos, E. Arak
2	Qualitative analysis of cations (two cations)	A. Meos, E. Arak
3.	Quantitative analysis of anions (one anion)	A. Meos, E. Arak,
4.	Qualitative analysis of anions (two anions)	A. Meos, E. Arak
5.	Qualitative analysis of cations and anions (one cation, one anion)	A. Meos, E. Arak
6.	Introduction to analytical balances. Calibration of volumetric glassware (pipette, volumetric flask, burette,	A. Meos, E. Arak
7.	Preparation of volumetric solution, determination of its titre (correction factor)	A. Meos, E. Arak
8.	Simultaneous titration of a mix of strong and weak bases using strong acid	A. Meos, E. Arak
9.	Redox titrations, assay of metamizole by direct iodometry	A. Meos, E. Arak
10.	Redox titrations, bromatometric assay of resorcinol	A. Meos, E. Arak
11.	Complexometric titrations, assay of calcium gluconate	A. Meos, E. Arak
12.	Argentometry, assay of potassium chloride	A. Meos, E. Arak
13.	Potentiometric end-point detection, nitritometric titration of sulphanilamide	A. Meos, E. Arak
14.	Identification of a active pharmaceutical ingredient using UV-spectrophotometry	A. Meos, E. Arak
15.	Spectrophotometric assay of a active pharmaceutical ingredient using standard of comparison	A. Meos, E. Arak
16.	Spectrophotometric assay of a active pharmaceutical ingredient. Preparation of a calibration curve	A. Meos, E. Arak
17	Potentiometric titration of a mix of hydrochloric acid and its salt with a weak organic base.	A. Meos, E. Arak, I. Laidmäe
18	Determination of the dissociation constant of a weak organic acid	A. Meos, E. Arak, I. Laidmäe
19	Spectrophotometric assay of a mix of two active pharmaceutical ingredients	A. Meos, E. Arak, I. Laidmäe
20	Identification of a active pharmaceutical ingredient using thin layer chromatography	A. Meos, E. Arak, I. Laidmäe
21	Analysis of chromatographic curve on simulated chromatogram	A. Meos, E. Arak, I. Laidmäe

Subtotal hours 84

Seminars

Week	Торіс	Teacher
7.	Test on topics covered in lectures and practicals at weeks 1-7	A. Meos, E.
		Агак
15.	Test on topics covered in lectures and practicals at weeks 8-15	A. Meos, E. Arak
17.	Calculations considering pH, dissociation and buffers	A. Meos, E. Arak,
18.	Calculations considering yield and solubility	A. Meos, E. Arak
19.	Calculations considering redox reactions, optical methods, chromatography	A. Meos, E. Arak
20.	Test on topics covered in lectures and practicals at weeks 17-20	A. Meos, E. Arak
21.	Briefing and discussion on results of test, correction of errors, second test for those who failed	A. Meos, E. Arak

TOTAL HOURS 140 + 140 independent work = 280

1. Identification

Name of Department: Department of Pharmacy			Code of Department. ARFA
Course Title in English and Estonian: Bioethics / Bioeetika			Subject Code:
National Credits (CP): 3	ECTS Credits (CP): 4,5	//
Study Level (Name of Curriculum): Pharmacy		Location in (semesters	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: The course aims to give knowledgr to solve eventual problems in the future professional work considering ethical standards.

Brief Description of the Course (Annotation):

The course gives overview of the most important concepts and problems in modern bioethics, and also trains skills to understand and solve ethical problems in medicine.

Languages of Teaching: Estonian

Study Period (in weeks): 16 weeks

Lecturers:

Maaja Paavo (responsible), Andres Soosaar

Course Web Page:

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures – 32 hours; seminars – 28 hours; independent work – 60 hours

3. Course Structure and Content

The detailed course structure and content schedule is attached in the end of the Course Outline.

24. Resources

The full list of lecture materials and textbooks for the courses taught at the Institute of Pharmacy and available at the institute's library are given in the separate appendix.

1. Dietrich v. Engelhardt. Eetika meditsiini argipäevas. Tartu, Tartu Ülikooli Kirjastus, 2002 [in Estonian]

2. Lois P. Pojman. Eetika. Õiget ja väära avastamas. Tallinn, Eesti Keele Sihtasutus, 2005 [in Estonian]

3. Sam Salek, Andrew Edgar. Pharmaceutical Ethics. Chichester, John Wiley & Sons, 2002

4. Robert M. Veatch, Amy Haddad. Case Studies in Pharmacy Ethics. Oxford, New York, Oxford

University Press, 1999
5. Tom L. Beauchamp, James F. Childress. Principles of Biomedical Ethics, 5th ed. Oxford, Oxford University Press, 2001
6. Maailma Arstide Liit. Arstieetika käsiraamat. Tartu, Elmatar, 2007
[in Estonian]

Available teaching Resources

- \square Teaching materials for lecture / classroom demonstration
- \boxtimes \square Teaching / learning materials to be distributed among students
- ☐ Teaching / learning materials in Internet
 - Laboratory and technical equipment

Patients

5. Assessment

Way of Final Assessment
Continuous assessment
Practical work or bedside evaluation
⊠ □ Written (test)
🖾 🔲 Written (essay)
🖾 🗌 Oral
Other
□ None
Composition of the Final Assessment (grade)
Grade "pass" is given if the student shows that he/she has acquired the knowledge, skills and competences required in the subject syllabus.

Programme

Week	Торіс	Lecturer
	Lectures:	
1	Philosophy and medicine. Health and disease as philosophical concepts.	A. Soosaar
2	Philosophy of causation. Mind-body problem. Consciousness.	A. Soosaar
3	Introduction to ethics. Value dimension of human behavior.	A. Soosaar
4	Historical overview and main theories of ethics I	A. Soosaar
5	Historical overview and main theories of ethics II	A. Soosaar
6	Introduction to medical ethics. Classical and modern medical ethics. The Hippocratic Oath.	A. Soosaar
7	Main principles of bioethics.	A. Soosaar
8	Medical professional—patient relationship.	A. Soosaar
9	Ethical issues of the beginning of life. Abortion.	A. Soosaar

10	Biomedical research ethics. Ethics committees.	A. Soosaar
11	Ethics and values in pharmacy.	M. Paavo
12	Justice in the allocation of health resources.	M. Paavo
13	Veractity. Dealing honestly with patients.	M. Paavo
14	Autonomy. External constraints on autonomy.	M. Paavo
15	Confidentiality. The ethics of promises. Privacy and data	M. Paavo
	protection.	
16	Ethics in the professional codes.	M. Paavo
	Seminars:	
2	Different conceptions of health and disease.	M. Paavo
3	Competition in medicine.	M. Paavo
4	The most important theories of ethics.	M. Paavo
5	Different forms of physician—patient communication.	M. Paavo
6	Ethics of clinical drug research.	A. Soosaar
7	Problems of narcomania.	M. Paavo
8	Ethics in reproductive medicine.	M. Paavo
9	End-of-life (care) problems. Euthanasia.	M. Paavo
10	Organ transplant.	M. Paavo
11	Ethical issues related to sensitive groups.	M. Paavo
12	Ethical issues related to the eHealth databases.	M. Paavo
13	Autonomy and medical informed consent.	M. Paavo
14	Justice. Limited resources in health care organisation and	M. Paavo
	availability of drugs.	
15	Ethical issues related to the Human Genome Project.	M. Paavo

APPENDIX XIX. COMPULSARY SUBJECTS TAUGHT IN THE FACULTY OF MEDICINE

COURSE OUTLINE

1. Identification

Name of Department: Department of Biochemistry		Code of Department. ARBK	
Course Title in English and Estonian:		Subject Code: ARBK 01.042	
Bioorganic chemistry			
Bioorgaaniline keemia			
National Credits (CP):ECTS Credits (CP):34.5			
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 3 rd semeste	Curriculum): er

2. Brief Description

Objectives and Outcomes of the Course:

This course of Bioorganic chemistry for students of Department of Pharmacy gives an introduction to basic organic chemistry, nomenclature of organic compounds, their classification, and reactions of most important functional groups. The course is important for medically relevant knowledge about structure and physico-chemical properties of drugs and bioactive organic compounds and about their synthesis and functionality. Course basic topics are helpful in further studies of Medical Biochemistry, Physiology, Pharmacology, etc.

Brief Description of the Course (Annotation):

Bioorganic chemistry is medicine-based course in which the following problems are highlighted: a) the principles of nomenclature and classification of organic compounds; b) stereochemistry of drugs and biomolecules and its biomedical background; c) general types of chemical reactions and synthesis methods of organic compounds; d) structure and activity relationships of organic compounds (especially biomolecules of human body and drugs).

Languages of Teaching: Estonian

Study Period (in weeks):

Lecturers: Associate Professor Ursel Soomets Associate Professor Ceslava Kairane

Course Web Page: http://biomedicum.ut.ee/arbk/

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures (44 hours); Seminars (27 hours); Practicals (3 hours); Independent work (46 hours)

1. Identification

Name of Department: Department of Biochemistry			Code of Department. ARBK
Course Title in English and Estonian:			Subject Code:
Medical Biochemistry Meditsiiniline biokeemia			ARBK 01.043
National Credits (CP): 3	ECTS Credits (CP) 4.5):	
Study Level (Name of Curriculum): Pharmacy	<u>.</u>	Location in (semesters 3th semest	<i>Curriculum):</i> er

2. Brief Description

Objectives and Outcomes of the Course: The aims of the course: a) to give an updated discussion of the selected and in practical work relevant knowledge about human body biomolecules and the metabolic events, underlying the specific functions of cells of the human body and disorders; b) to give an updated and human body oriented biochemical basis of preparation of vitamins, minerals and cosmetics, food additives and to analyse pharmaceytically important aspects of nutrition; c) to develop biochemical-pharmaceytical thinking and to create the basis for using the biochemical experience in the practice of the future and to guarantee the systemic acquiring of new scientific conceptions. Course basic topics are helpful in further studies of Physiology, Pathophysiology, Immunology, etc.

Brief Description of the Course (Annotation):

This course provides students with basic knowlegde of contemporary Medical Biochemistry and develop biochemical-clinical thinking The following problems are highlighted: a) basic biomolecules of human body (their structure an biofunctions); b) vitamins and hormones and human organism (including science-based analysis of medical preparations of vitamins); c) overview of metabolism of carbohydrates, lipids, amino acids, nucleic acids; d) biochemical background of detoxification of xenobiotics (including drugs); c) science-based analysis of role of human nutrients and principles of nutrition.

Languages of Teaching: Estonian

Study Period (in weeks): 8

Lecturers:

Ass Prof. Ceslava Kairane and Prof. Mihkel Zilmer

Course Web Page: http://biomedicum.ut.ee/arbk/

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures (24 hours); seminars (38 hours); practicals (10 hours); independent work (48 hours)

1. Identification

Name of Department. Department of Pharmacology			Code of Department. ARFR
<i>Course Title in English and Estonian</i> : Pharmacotherapy Farmakoteraapia			Subject Code: 02.017
National Credits (CP): 2.5	ECTS Credits (CP, 3.75):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters) 8	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: The aim of the course is to link the basic pharmacological knowledge with the therapeutic concepts (a science-based medicine). The program of pharmacotherapy for pharmacy students concerns pharmacokinetics in pathological conditions. Basic therapy of most common pathologies is given: psychiatric, cardiovascular, metabolic, immunological and gastrointestinal diseases. The regimes and adverse effects are especially pointed out. Also basic principles of antibacterial and antiviral chemotherapy are considered.

To achieve the course aim students have to participate on the lectures, on the seminars and work independently.

Languages of Teaching: Estonian

Study Period (in weeks): 16 weeks

Lecturers:

A. Zharkovsky, professor

A. Kalda, senior research fellow

A. Irs, assistant

P. Pokk, senior lecturer

Course Web Page: http://www.med.ut.ee/arfr

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures – 32 h, seminars – 28 h, independent work – 40 h

1. Identification

Name of Department. Department of Pharmacology			Code of Department. ARFR
Course Title in English and Estonian:			Subject Code:
Drug Toxicology			02.034
Ravimite toksikoloogia			
National Credits (CP):	ECTS Credits (CP)):	
1.5	2.25		
Study Level (Name of Curriculum):		Location in	Curriculum
Pharmacy		(semesters):
		8	<i>,</i>
		-	

2. Brief Description

Objectives and Outcomes of the Course:
Equip students with basic knowledge in drug toxicology.
Brief Description of the Course (Annotation):
Examines basic concepts of drug toxicology from molecular toxicity to the toxicity of organ systems.
Languages of Teaching:
Estonian
Study Period (in weeks):
15 weeks
Lecturers:
Allen Kaasik, professor
Course Web Page:
http://www.med.ut.ee/arfr
Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)
Lectures – 22 h, Seminars – 8 h, independent work – 30 h

1. Identification

Name of Department. Department of Pharmacology			Code of Department. ARFR
<i>Course Title in English and Estonian</i> : Pharmacology Farmakoloogia			Subject Code: 02.038
National Credits (CP): 8.5	ECTS Credits (CP) 12.75):	
<i>Study Level (Name of Curriculum):</i> Pharmacy		Location in (semesters) 6 and 7	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: After passing the course the student must have basic knowledge about the main groups of drugs. The cource also gives starting knowledge for studying pharmacotherapy.
Brief Description of the Course (Annotation): The basic course of pharmacology for pharmacy students relates to pharmacology, pharmacokinetics, pharmacodynamics of main groups of drug.
Languages of Teaching: Estonian
Study Period (in weeks): 32 weeks
<i>Lecturers:</i> Paavo Pokk, senior lecturer (responsible) Katrin Pruus, assistant Sander Sepp
Course Web Page: Link from the web page of Department of Pharmacology http://www.med.ut.ee/arfr http://www.med.ut.ee/115444
Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) Lectures – 64 hours, seminars – 140 hours, independent work – 136 h

1. Identification

Name of Department: Department of Physiology			Code of Department. ARFS
Course Title in English and Estonian: Biophysics. Biofüüsika.			Subject Code: ARFS.01.023
National Credits (CP): 3	ECTS Credits (CP): 4,5	:	
Study Level (Name of Curriculum): Medicine, Dentistry and Pharmacy		Location in (semesters) 1. semeste	<i>Curriculum</i>): r

2. Brief Description

Objectives and Outcomes of the Course:

- This cource should offer the following:
- 1. Knowledge of the methodological basis of physics.
- 2. Study of relevant topics of physics in medicine.
- 3. Understanding of biophysical basis of living organism functioning.
- 4. Skills to work with modern biophysical measurement equipment

Brief Description of the Course (Annotation):

This course covers special topics of physics in order to understand the physiological processes in the whole organism and its connections with environment. Our aim is to give an overview of more relevant biophysical processes, regulatory principles and ways of transforming information in living body, and also to introduce students into modern possibilities of biomedical engineering and technology for measurement, recording and analysing of physiological processes.

Languages of Teaching: Estonian and English

Study Period (in weeks): 16 weeks

Lecturers:

Associate Prof. Jana Kivastik, Associate Prof. Jaak Talts, Senior Researcher Kersti Jagomägi, Senior Researcher Rein Raamat, Assistant Kaido Kurrikoff

Course Web Page: http://biomedicum.ut.ee/biofys/

Work Volumes and Formats (lectures, classes, seminars, colloquia, e-learning, practical training, independent work)

46 h of lectures, 3 h of seminars, 21 h of practical training, 50 h of independent work

1. Identification

Name of Department: Department of Physiology			Code of Department. ARFS
<i>Course Title in English and Estonian</i> : Biotechnology, Biotehnoloogia			Subject Code: ARFS.01.062
National Credits (CP): 2	ECTS Credits (CP): 3	:	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters) 8	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course: The goal of course is to teach the basic concepts and methods of biotechnology to the pharmacy students.

Brief Description of the Course (Annotation):

This course gives basic overview on the molecular biology and more detailed description on the existing molecular technologies. Lectures cover from basic nucleic acid technologies (including PCR technologies and gene microarrays), protein technologies (purification, antibodies) up to modern transgenic and cloning (somatic cell nuclear transfer) technologies. In addition, we give detailed overview on the major pharmaceutical applications of biotechnology. In seminars we discuss recent or classical and important papers from Nature Biotechnology, New England Journal of Medicine, Nature, Sciense.

Languages of Teaching: Estonina

Study Period (in weeks): 4 weeks

Lecturers:

4

Course Web Page: none

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) 28 lectures, 20 colloquia

1. Identification

Name of Department. Department of Physiology			Code of Department. ARFS
<i>Course Title in English and Estonian</i> : Human physiology. Inimese füsioloogia.			Subject Code: ARFS.01.063
National Credits (CP): 7	ECTS Credits (CP) 9):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 2. and 3. se	<i>Curriculum</i>): emesters

2. Brief Description

Objectives and Outcomes of the Course: Aim of this course is to give to students of pharmacy basic knowledge in body function and control, specific attention is paid to physiological mechanisms responsible for the introduction, transport and elimination of drugs.

Brief Description of the Course (Annotation):

The course covers general aspects of function and regulation of all organ systems, from the molecular level to the level of the whole organism.

Languages of Teaching: Estonian

Study Period (in weeks): 32 weeks

Lecturers:

Associate Prof. Jana Kivastik, Senior Teaching Assistant Ivar-Olavi Vaasa, Researcher Sirli Raud, Assistant Alar Veraksitš

Course Web Page:

All study materials and information is available from the Study Information System (ÕIS)

Work Volumes and Formats (lectures, classes, seminars, colloquia, e-learning, practical training, independent work)

80 h of lectures, 80 h of practical training, 8 h of seminars and 112 h of independent work

1. Identification

Name of Department. Surgery			Code of Department. ARKI
<i>Course Title in English and Estonian:</i> First Aid Esmaabi			Subject Code: 01.004
National Credits (CP): 2	ECTS Credits (CP, 3):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters) 7 (2001/200 2 (2002-200	<i>Curriculum):</i> 02) elective 06) comp.

2. Brief Description

Objectives and Outcomes of the Course:
To teach students basic methods of first aid in providing help to patients in critical state
Brief Description of the Course (Annotation):
General issues of surgery and the fundamentals of surgical and traumatological treatment and intensive care of patients.
Languages of Teaching:
Estonian
Study Period (in weeks):
3rd13th or 23rd-35th study week
Lecturers:
Assistant H. Seepter, lecturers of the departments of traumatology and orthopaedics, and
anaesthesiology and intensive care.
Course Web Page:
-
Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)

Lectures (24 hours) Practicals (24 hours) Independent work (32 hours)

1. Identification

Name of Department. Department of Microbiology			Code of Department. ARMB
Course Title in English and Estonian: Medical Microbiology / Meditsiiniline mikrok	bioloogia		Subject Code: ARMB.01.001
National Credits (CP): 4 CP	ECTS Credits (CP) 6 CP):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 2 nd semes	<i>Curriculum</i>): ster

2. Brief Description

Objectives and Outcomes of the Course: The course gives theoretical knowledge on classification, morphology, physiology and pathogenic effect of bacterial, viral, parasitary and fungal diseases of human organism; basic principles of microbiological diagnostics, prophylaxis and treatment Brief Description of the Course (Annotation). Classification, taxonomy, morphology, physiology and genetics of microorganisms. Microflora of environment and human organism. Antibiotic resistance. Microbial pathogenicity and virulence. Toxins. Resistance of human organism. Specific prophylaxis of infectious diseases. Microbiologica diagnostics of infections. Infections caused by cocci. Intestinal tract and urinary tract infections. Airborne and sexually transmitted infections. Anaerobic infections, zoonoses, spirochaetoses, fungal infections. Viral infections and main principles of their diagnostics Languages of Teaching: Estonian Study Period (in weeks): 24th up to 39th study weeks Lecturers: Tõnis Karki (responsible), Silver Türk, Kristi Huik k Course Web Page: http://biomedicum.ut.ee/armb/ Work Volumes and Formats (lectures, practicals, seminars, colloguia, e-learning, independent work) Lectures 16 h Laboratory work 40 h Seminars 24 h

Individual work 81 h

1. Identification

Name of Department. Department of Microbiology			Code of Department. ARMB
Clinical Microbiology / Kliiniline mikrobiolog	ogia		Subject Code: ARMB.01.053
National Credits (CP): 1 CP	ECTS Credits (CP) 1.5 CP):	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters) 3 rd semes	<i>Curriculum</i>): ster

2. Brief Description

Objectives and Outcomes of the Course: Explain the role of microbes in the clinical settings and community acquired infections and to understand the basic principles of antimicrobial treatment and antibacterial resistance Brief Description of the Course (Annotation). Provides a brief introduction to the field of clinical microbiology to include the most frequent topics of hospital and community acquired infections (respiratory tract infections, urinary tract infections, skin and soft tissue infections, nosocomial infections etc). This will be followed by the close cooperation with aspects of antibacterial treatment and antibacterial resistance. Pharmacokineticpharmacodynamic aspects of most important antimicrobial antibiotics and disinfectants, rational choice of preparations based on specify and properties of infectious agents, also the basics of development and spread of drug resistance are given Languages of Teaching: Estonian Study Period (in weeks): 10 weeks Lecturers: Tõnis Karki Course Web Page: http://biomedicum.ut.ee/armb/ Work Volumes and Formats (lectures, practices, seminars, colloguia, e-learning, independent work) Lectures 20 h Individual work 20 h

1. Identification

Name of Department. Department of General and Molecular Pathology		Code of Department. ARMP	
Course Title in English and Estonian:			Subject Code:
Genetics, Geneetika			ARMP.01.030
National Credits (CP):	ECTS Credits (CP)):	
2	3		
Study Level (Name of Curriculum):		Location in	Curriculum
Pharmacy		(semesters):
		6	-

2. Brief Description

Objectives and Outcomes of the Course:
The aim of the course is to allow students to learn
- the basic principles of genetics and
- connections between genetics and pharmacy.
Brief Description of the Course (Annotation):
The students get the knowledge in the field of classical genetics, cytogenetics, molecular genetics, medical genetics and pharmacogenetics
Languages of Teaching:
Estonian
Study Period (in weeks):
10 weeks
Lecturers:
Gunnar Tasa
Course Web Page:
http://biomedicum.ut.ee/armpgb/proviisor/geneetika.php
Work Volumes and Formats (lectures, classes, seminars, colloquia, e-learning, practical training, independent work)
10 lectures (20 hours) and 60hours of independent work

1. Identification

Name of Department.			Code of Department.
Department of General and Molecular Pathology			ARMP
Course Title in English and Estonian:			Subject Code:
Immunology			ARMP.02.016
Immunoloogia			
-			
National Credits (CP):	ECTS Credits (CP):		
1	1,5		
Study Level (Name of Curriculum):	L	ocation in	Curriculum
Pharmacy	('semesters):
	Ż	7	

2. Brief Description

Objectives and Outcomes of the Course: To get basic and applied immunology prediploma training in pharmacy. Brief Description of the Course (Annotation): Basic knowledges about cellular and molecular aspects of immune system are given taking into acco unt pecularities of pharmacy. Languages of Teaching: Estonian Study Period (in weeks): 12 Lecturers: Koit Reimand, Kalle Kisand, Tamara Vorobjova, Ija Talja, Ivo Laidmäe, Kai Kisand Course Web Page: Intranet Work Volumes and Formats (lectures, classes, seminars, colloquia, e-learning, practical training, independent work) Lectures, practicals, seminars, independent work

1. Identification

Name of Department.			Code of Department.
Polyclinic and Family Medicine			ARPO
Course Title in English and Estonian:			Subject Code:
Primary care medicine.			
Esmatasandi meditsiin.			ARPO.00.020
National Credits (CP):	ECTS Credits (CP)):	
3	4,5		
Study Level (Name of Curriculum):		Location in	Curriculum
Pharmacy		(semesters):
		1	

2. Brief Description

Objectives and Outcomes of the Course:

To acquire clinical knowledge and skills to communicate with patients and to give advice in pharmaceutical setting.

To understand the role of primary care in the health care system. To acquire knowledge of common health problems and of the diagnostics and medical and non-medical management and prevention of these problems. To train skills for patient-centered communication.

Brief Description of the Course (Annotation):

The course provides skills necessary for primary health care contact in pharmaceutical setting, including understanding role of primary care and team-work in health care system, understanding of diagnostic principles in primary care, ability to identify common conditions, recommend appropriate medications and non-medical managements, and patient-centered communication skills.

Languages of Teaching: Estonian

Study Period (in weeks):10

Lecturers:

Heidi-Ingrid Maaroos, Ruth Kalda, Marje Oona, Anneli Rätsep, Urmas Takker, Pille Ööpik, Heli Tähepõld

Course Web Page: www.arpo.ut.ee

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) lectures: 20; seminars: 40; independent work: 60

APPENDIX XX. COMPULSARY SUBJECTS TAUGHT IN OTHER FACULTIES

COURSE OUTLINE

1. Identification

Name of Department: Faculty of Science and Technology; Institute of Chemistry		Code of Department: old: FKFE new: LOKT
Course Title in English and Estonian: General and I Üldine ja anorgaaniline keemia	norganic Chemistry	Subject Code FKFE.00.008
National Credits (CP): 4	ECTS Credits (CP): 6	
Study Level (Name of Curriculum): Pharmacy		Location in Curriculum (semesters): 1

2. Brief Description

Objectives and Outcomes of the Course: Student knows:

- main principles of chemical thermodynamics, kinetics and electrochemistry
- physical equilibria, aqueous equilibria
- structure of atoms and main principles of chemical bond
- nomenclature, preparation and chemical properties of inorganic compounds needed from the position of pharmacist profession

Student is able to

- carry out simple qualitative and quantitative laboratory experiments (weighing, measuring different volumes, heating, prepearing of solutions, titration)
- draw conclusions based on the results
- carry out simple calculations.

Brief Description of the Course (Annotation): The main attention is paid to chemical thermodynamics, kinetics, electrochemistry and solution subject matters. Structure of atoms and principles of chemical bond are also considered. Preparation, physical and chemical properties and physiological effects of different substances, that are mostly important for the pharmacy studies, are introduced.

Languages of Teaching: Estonian

Study Period (in weeks): 16

Lecturers: J.Ehrlich, E.Jüriado, A.Hallik, A.Alumaa

Course Web Page:

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)

lectures 48 hours; practicals 32 hours; independent work 80 hours

1. Identification

Name of Department.			Code of Department:
Language Centre			FLKE
Course Title in English and Estonian:		Subject Code:	
Latin in Pharmacy Farmaatsiaalane ladina keel			FLKE.02.199
National Credits (CP):	ECTS Credits (CP):		
2 CP	3 CP		
Study Level (Name of Curriculum):		Location in Curriculum (semesters):	
Dhormony		1 Semeste	r
Pharmacy			

2. Brief Description

Objectives and Outcomes of the Course:
The course focuses on Latin for students of pharmacy.
Brief Description of the Course (Annotation):
Derivation of medical terminology is studied, as well principles of compiling designations of herbs, medications and anatomical terms in Latin. A survey of reading, translating and writing prescriptions in Latin is given.
Languages of Teaching:
Estonian
Study Period (in weeks):
15
Lecturers:
Kaarina Rein, Annika Kuuse
Course Web Page:
https://www.is.ut.ee/pls/ois/!tere.tulemast
Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work)
Lectures, practical training, independent work
COURSE OUTLINE

1. Identification

Name of Department: CENTRE FOR ENTREPRENEURSHIP			Code of Department. MJCV
<i>Course Title in English and Estonian</i> : Basics of Creation and Development of Enterprise Ettevõtte loomise ja tegutsemise alused		Subject Code: MJJV.08.028	
National Credits (CP): 2	ECTS Credits (CP,): 3	
Study Level (Name of Curriculum): Pharmacy		Location in (semesters 8	Curriculum):

2. Brief Description

Objectives and Outcomes of the Course:

To give knowledge about starting an enterprise, forming its strategy, forming its business plan and coordinating its activities

The course :

1) Is shaping understanding about entrepreneurship as interdisciplinary field of knowledge and about the role of entrepreneurship in society;

2) Is shaping understanding about entrepreneurial processes;

3) Gives practical skills for planning and analyzing own business and entrepreneurial process

Knowledge, the student knows:

1) Overview about entrepreneurship as interdisciplinary field of knowledge and phenomena in society; 2)

Main concepts: entrepreneurship, entrepreneur, enterprise, innovation, entrepreneurial process, small and mediumsize enterprise-SME, family enterpise, university spin off company, corporate entrepreneurship, intrapreneurship, clusters and networks, social entrepreneurship, risk and risk management;

3)Understanding about entrepreneurial process, strategic options of entrepreneur

and implementation, legalform of company, management of SME, implementation of entrepreneurship in big corporations, public and non-profit sectors.

Special Skills and Competences, the student have:

1) Understands main concepts of entrepreneurship and enterprise;

2) Manages with the analysis entrepreneurial opportunities and business environment;

3) Understands and uses practical tools for business planning.

Brief Description of the Course (Annotation):

Gives an overviw about the problems of starting an enterprise, requierments presented to the creator of enterprise, about enterprise starting models, and other decisions connected with starting one, about the risk in entrepreneurship. Basics of forming business strategy, business plan, operating fundamentals of different functional areas, and the problems of their coordination are covered.

Languages of Teaching: Estonian language

Study Period (in weeks): in weeks 24-35

Lecturers: Aivar Pere

Course Web Page: In: Study Information System (ÕIS)

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) lectures: 14 practicals: 0 seminars: 10 colloquia: 0 e-learning: 0 independent work: 56

COURSE OUTLINE

1. Identification

Name of Department: Institute of Mathematical Statistics		Code of Department. MTMS	
Course Title in English and Estonian:			Subject Code:
Statistical Analysis, Statistiline analüüs		01.085	
National Credits (CP): 3	ECTS Credits (CP) 4,5	:	
Study Level (Name of Curriculum):		Location in	Curriculum
Pharmacy		(semesters) 1):

2. Brief Description

Objectives and Outcomes of the Course:

The aim of the course is to provide a systematic overview of basic statistical analysis.

- The goals of the course are:
 - (1) to give an short introduction to probability theory and basic concepts of statistics
 - (2) to develop basic skills of explanatory analysis of biomedical data

After passing through the course a student

- (1) knows basic statistical terms, concepts and methods
- (2) is able to use simple statistical tests and interpret the results
- Brief Description of the Course (Annotation):

The following topics will be covered: Introduction to probability theory (probability, conditional probability, distribution, estimation, Normal, binomial and Poisson distribution), descriptive statistics, confidence intervals, concept of statistical hypothesis, significant level, probability level. Contingency tables, Chi-square test. T-test for one sample and two dependent/independent samples. One-way ANOVA, simple regression model. Validity and Reliability.

Languages of Teaching: Estonian

Study Period (in weeks): 12

Lecturers: Ene Käärik, PhD

Course Web Page:

- (lectures in Study Information System)

Work Volumes and Formats (lectures, practicals, seminars, colloquia, e-learning, independent work) 12 lectures + 12 practicals (a' 2 hours)

APPENDIX XXI. ELECTIVE SUBJECTS IN THE PHARMACY MASTER PROGRAM (2008/2009)

ARFA.02.080 Exercises and Problems in Pharmaceutical Analysis 0.5 CP/0.75 ECTS

Department of Pharmacy

The most general problem types for pharmaceutical analysis are considered like concentration, pH or reaction ratio computations.

ARFA.01.034 Phytotherapy

Department of Pharmacy

Using possibilities of medicinal plants and herbal products for the prevention, relievening and treatment of well-known diseases and disorders and disorders, as well as thier contraindications and safety are discussing topics.

ARTH.04.023 Prevention of HIV/AIDS. HIV Positive Patient

Department of Public Health

During the course an overview will be given about the structure of HI virus, definition of HIV infection and AIDS, its stadiums and progression, changes in the organism, groups with higher risk, main methods to prevent HIV among different risk groups, the institutions and organizations dealing with the prevention of HIV in Estonia, about the National Program for HIV/AIDS prevention. Organization of the treatment and rehabilitation of young drug-abusers and problems related to sexual education in schools will be discussed. Anonymous Cabinet for HIV testing and counseling and the Youth Counseling Center will be visited in Tartu. The rights and tasks of HIV-infected persons, corresponding laws, the problem of stigmatization and possibilities to prevent it will be discussed.

FKFE.01.039 Solutions

Department of Inorganic Chemistry, Faculty of Science and Technology

In the course the following calculations and problems are treated: various expressions of solution's concentration, calculations, the solubility product, colligative properties of solutions.

ARLA.01.033 Why and to Which Factors We are Allergic?

Department of Paediatrics

Presenting an exhaustive summary of the latest concepts relating allergy, the prevalence of allergic diseases, why allergic diseases are on the increase, different pollens, allergy symptoms, diagnostic options and treatment principles.

ARSI.01.015 Spectacles, Contact lenses and Refractive Surgery

Department of Ophthalmology

Students without medical background will be explained about eye anatomy, function and decrease of visual acuity, improvement of vision with different spectacles, contact lenses and surgeries.

ARTH.04.022 Principles of Sexual Education According 3 CP/4.5 ECTS to Peer Education Methodology

Department of Public Health

The subject is divided into three parts: in the theoretical part psychosexual development of children and adolescents, formation of sexual identity, the principles of sexual education in different age groups,

1 CP/1.5 ECTS

0.5 CP/0.75 ECTS

Senior Lecturer A. Raal

1 CP/1.5 ECTS

1 CP/1.5 ECTS

1 CP/1.5 ECTS

Lecturer A. Meos

basic knowledges about contraceptives ,and about sexually transmitted diseases will be discussed with students. Theoretical methodology, practical skills of peer-education, basic knowledges about pedagogy and organizing seminars for adolescents will be introduced, the organization of sexual education and counceling will be discussed. In the second part students have to present seminars by themselves, these seminars will be recorded and late discussed. In the third students have to go schools where they carry out real seminars that will be followed the discussion together with the lecturer.

FLFI.00.002 Introduction to Philosophy

Department of Philosophy and Semiotics

ARTH.04.024 Smoking and Health

Department of Public Health

The course gives students basic knowledge about health risks related to smoking and about different methods how to guit smoking. Lectures and discussions in seminars give systematic knowledge about smoking prevalence during last decade, about factors contributing smoking, about health policy related to the tobacco use, about organizations working on the field of smoking prevention, about different suggestions how to quit smoking.

ARLA.01.034	Neonatal Physiology and
	Behaviour. Breastfeeding

Department of Paediatrics

he course describes some aspects of family planning and pregnancy, fetal development in preparation for extrauterine life (e.g. development of fetal senses and learning abilities), neonatal behavior and development, mother-infant bonding and attachment, breastfeeding and councelling of parents

ARMB.01.032 Principles of Clinical Use of **Antimicrobial Treatment**

Department of Microbiology

Pharmacocinetical-pharmacodynamical aspects of most important antimicrobial antibiotics and disinfectants, rational choise of preparations based on specifity and properties of infectious agents, also the basics of development and spread of drug resistance are given

ARFS.01.060 The Diffuse Neuroendocrine System

Department of Physiology

The course explains the diffuse neuroendocrine system (DNS) concept, structure, quality of hormone which belong to mentioned system. Mainly treat DNS hormone effect in gastrointestinal tract.

FLKE.03.060	Estonian for Students of Medicine	
	(Based on Russian), Level B2.1 > C1.1	4 CP/6 ECTS

Division of Estonian, Faculty of Philosophy

The aim is to enhance vocabulary in the field of medicine. During the course reading and listening comprehension skills will be developed. Typical work situations will be role-played.

ARBK.01.021 Basic Knowledge for the Research in Medical Biochemistry (I)

1 CP/1.5 ECTS

Department of Biochemistry

1 CP/1.5 ECTS

1 CP/1.5 ECTS

1 CP/1.5 ECTS

1 CP/1.5 ECTS

0.5 CP/0.75 ECTS

Primary aims of this course: to give theoretical and practical instructions about general methods used in Medical Biochemistry.

ARMP.03.019 Basic Research in Pathophysiology I

Department of General and Molecular Pathology

Within this course the students acquire the methods for studies on function and bioenergetics of the cardiac and skeletal muscle at gene, protein, cellular and tissue levels in normal and pathological conditions.

ARMP.03.020 Basic Research in Pathophysiology II

Department of General and Molecular Pathology

The course is meant to continue the research atarted during the preceding course ARMP.03.019. The students will acquire the experience in analysis and presentation of their results in studies on the disease of myocardium and skeletal muscle.

ARFA.02.019 Propaedeutical Training

Department of Pharmacy

The aim of this elective subject is to give an introduction to work in pharmacies.

ARMP.03.010 Cellular Injury Mechanism. Medical and **Nonmedical Prophylaxis**

Department of General and Molecular Pathology

Present course contains knowledge of specific and non-specific cell damage(hypo- and hypermetabolic states; energy-, electrolyte-, fluid- and acid-base imbalance; oxidative stress...) and intracellular adaptation mechanisms (HSPs, Pg, antioxidants, adenosine...). Principles of medicamental and non-medicamental prophylaxis and corrections of cell damage.

ARFR.02.031 Student Research in Pharmacology and Drug Toxicology I

Department of Pharmacology

ARFS.01.005 Neurophysiology of Pain

Department of Physiology

Participant will understand:

1) functioning of nociceptive system under physiological conditions

2) functioning of nociceptive system in case of various diseases

3) targets for analgesic drugs, rational use of analgesic drugs

This course covers the key issues in pain physiology: perception of pain, differences from other senses, nociceptive pathways, transmitters involved, organization and functioning of antinociceptive system, classification of pain, pain models, mechanisms of common clinical pain states, mechanism of action of distinct classes of painkillers.

ARFA.01.024 Pharmaceutical Entrepreneurship

Department of Pharmacy

The elective course is devoted to the nature of entrepreneur, choice of the form of ownership, advantages and disadvantages of buying, renting and building; thorough choice of location, and as a result nescessary research, business plan, financial management, application for operating license,

0.5 CP/0.75 ECTS

2 CP/3 ECTS

5 CP/7.5 ECTS

1 CP/1.5 ECTS

1 CP/1.5 ECTS

Assistant T.-M. Tammaru

4 CP/6 ECTS

4 CP/6 ECTS

Assistant M Paavo

To introduce tha main health effects of toxic compounds work environment in Estonia. To analyse relationships between occupational exposure and clinical picture of poisonings. To learn the diagnostics and dif-diagnostics of occupational poisononings and general diseases. To get aware about the methods treatment of poisonings and principles of diminishing and prevention of health risks caused by chemicals in living and work environment. The course is built up on the general principles of toxicology and exposure assessment. Course must

give overview about the main sources and health effects of toxic compounds in work environment. The basics diagnostical methods of occupational poisononings are introduced. Learning of methods of treatment and rehabilitation of poisonings and principles of diminishing and prevention of health risks caused by chemicals in living and work environment will take palce.

ARTH.01.042 Environmental and Occupational Health

Department of Public Health

Students will be able to understand main health risks in ambient environment including work environment.

Main health risks in ambient environment: risks related to atmosphere and air, drinking water and food. Basic methods for health impact assessment. Pharmacy as a work environment.

ARFA.02.021	Pharmaceutical Technology of
	Pediatric and Geriatric Medicines

Department of Pharmacy

To introduce the peculiarities of the preparation of pediatric and geriatric medicines. Excipients in different dosage forms.

ARBK.01.035 Basic Knowledge for the Research in Medical Biochemistry (II)

Department of Biochemistry

Primary aims of this course: to give an updated theoretical and practical discussion about general methods used in Medical Biochemistry for students who are interested in scientific work.

ARMP.03.028 Pathophysiology of the Microcirculation

Department of General and Molecular Pathology

This elective course is aimed to discuss the mechanisms of disorders of microcirculation under different pathological conditions such as neoplasia, ischemia-reperfusion injury, diabetes, thermal injury, immunologic injury, environmental factors, and aging.

legislation on starting and management of a business, documentation and factors that cause failures in business.

ARFA.01.025 The Choice of Pharmaceutical Staff

Department of Pharmacy

Department of Public Health

This elective course deals with criteria for good judgement of people, individual differences of people, their attitude towards this work and their colleagues, interaction, management, new value systems, conflicts, staff development and its choice, specific character of the pharmacist's job and descriptions of the job as well as the requirements for a person who works with the clients.

ARTH.01.080 Environmental and Occupational Toxicology 2 CP/3 ECTS

Assistant T.-M. Tammaru

1 CP/1.5 ECTS

2 CP/3 ECTS

1 CP/1.5 ECTS

3 CP/4.5 ECTS

1 CP/1.5 ECTS

Assistant M. Paavo

ARFR.02.036 Music, Brain and Emotions

Department of Pharmacology

The main objectives of the course are to provide students with knowledge of the basic neurological mechanisms of music discern, how music alters a human psychic, and the main principles of music therapy. To rise a scientific interest to do research on problems related with musical discern. During the course students will be reviewed with hearing biology, analyse of music, the structures of brain involved with discern of music. The course will be reviewed relationship between music and inteligency, and between music and diseases, also reviewd main principles of music therapy.

ARFR.02.041 Antiinflammatory Agents

Department of Pharmacology

To provide the students with the deep understanding of the mechanism of action of the antiinflammatory drugs. To enable students to understand how the molecular mechanism of action can be converted in the beneficial and hazzardous effects of the antiinfalmmatory drugs in treatment of various forms of inflammation. To promote oral presentation and discussion skills.

ARFA.02.081 Radiopharmaceuticals

ARFA.02.015 Synthesis of Drugs

Department of Pharmacy

This is an introductory course to radiopharmaceuticals. Notions like isotope, radioactive decay, half-life, different kinds of radioactive irradiation are considered. Basic methods of qualitative and quantitative analysis of radioactive preparations are presented.

Senior Lecturer Emeritus E. Arak **Department of Pharmacy** Introduction to the problems and methods connected to synthesis of medicinal substances, practical synthesis of medicinal substances in laboratory conditions, analysis, gaining experience for producing high-grade medicinal substances.

ARFA.01.023	Herbs for Skin Care	1 CP/1.5 ECTS
Department of	Pharmacy	Lecturer U. Paaver
During this cour and industrial c	rse students can learn more about possibilities to osmetics.	use medicinal plants in home-made
ARFA.02.025	Analysis of Dosage Forms	0.5 CP/0.75 ECTS
Department of	Pharmacy	Senior Lecturer T. Hinrikus
Main principles	of the chemical analysis of different dosage form	S
ARFA.02.029	Classification of Dosage Forms	1 CP/1.5 ECTS
Department of	Pharmacy	Professor P. Veski
Theoretical bac	kground of the classification of dosage forms in I	European Pharmacopoeia.

Department of Pharmacology

ARFR.02.047 Introduction to Toxicology

1 CP/1.5 ECTS

1 CP/1.5 ECTS

0.5 CP/0.75 ECTS

Lecturer A. Meos

1 CP/1.5 ECTS

2 CP/3 ECTS

1 CP/1.5 ECTS

The course deal with the main problems of the clinical toxicology: intoxication as cause of a disease, acute and chronic intoxication, the environmental factors and the medicines caused poisoning. Reviewed the mechanisms of poisons and venoms, the pharmacokinetics of toxic substances, the clinical symptoms and the main concepts of treatment.

ARMP.03.025 Pathophysiology of Stress

Department of General and Molecular Pathology

Stress, general adaptation syndrome and its phases. The influence of the weak, middle and strong stressors on the organism functions. Stress damages (maladaptation) mechanisms. Central and local stress-limiting mechanisms (GABA, endogenous opioid peptides, prostaglandines, adenosine, antioxydants e.t.c.)

ARFR.02.032 Student Research in Pharmacology and Drug Toxicology II

Department of Pharmacology

The students will acquire the experience in analysis and presentation of their results.

ARTH.04.018 Health Promotion

Department of Public Health

The goal of this course is to provide pharmacy students with theoretical knowledge about health promotion, the associations between health and society and the principles to change these associations at the level of person, community and society.

The goal of this course is to provide pharmacy students with theoretical knowledge about health promotion, the associations between health and society and the principles to change these associations at the level of person, community and society.

ARTH.01.014 Water and Health

Department of Public Health

The course introduces the role of water in human organism and the importance for health, describes the water resources of earth and Estonia, discusses the different sources of drinking water for the point of public health and the public water supply in Estonia. The main sources of water pollution, methods of treatment of effluents and principles of water protection as well international co-operation in this field will be described.

AROT.00.030 Andragogy and Higher Education

Department of Nursing Science

The adult learner, the adult learning and the adult teaching. Developing students`learning and thinking skills. Lifelong learning.

AROT.00.033 Developmental Psychology

Department of Nursing Science

The lectures focus on principles of cognitive, social, and emotional development during the entire life of person. Atention is paid also to most common poblems of person self-knowledge and self-succeeding.

ARFA.02.038 Bioadhesive Formulations

Department of Pharmacy

0.5 CP/0.75 ECTS

1 CP/1.5 ECTS

1 CP/1.5 ECTS

5 CP/7.5 ECTS

2 CP/43 ECTS

2 CP/3 ECTS

1 CP/1.5 ECTS

Professor P. Veski

Mechanisms of bioadhesion, excipents, methods of the quality control will be described.

ARFA.02.083 Biopharmaceutical Aspects of Generic Formulations 1 CP/1.5 ECTS

Department of Pharmacy

The aim of present elective course is to interpret the bioequivalency of original, generic, pseudogeneric and pharmaceutical alternative formulations.

ARAR.00.001 Medical Law

Department of Public Health

AROT.01.013 Project Work Methods

Department of Nursing Science

The aim of the course is to give the student knowledge about principles of project work, knowledge and skills for planning project based developmental work and for compile project plan, and to deepen her/his understanding about the need for systematic evidence based developmental work in different nursing areas.

After the completion of the course, student will be able to:

1) define the main concepts related to project work,

2) describe and explain the nature of project cycle and the phases of systematic project work,

3) describe and explain the principles of project management,

4) describe and explain the principles of the evaluation of the project and evaluation criteria,

- 5) plan systematic evidence based developmental work,
- 6) compile the project plan and write an application,

7) critically evaluate completed project plan.

ARFA.01.012 SCREEN-Technique in Phytochemistry

Department of Pharmacy

During particular course student can learn principles of SCREEN-technique and how to analyse active compounds of the medicinal plants by thin layer chromatography. SCREEN-technique in phytochemistry is dealing with primary studies of active components (as flavonoids, coumarines, athracene derivatives, saponins, tannins etc.) of medicinal plants.

AROT.00.036 Health Care System and Policy

Department of Nursing Science

Health care in Estonia is a cost-effective and complex system grounded in health policy and to reclaim health from disease. This course describes this system. The different types of services, from primary health care to hospitals, are discussed. In addition, seven special themes are presented (e.g. health policy, healthcare policy, primary healthcare plan, hospital master plan). This course is a must for all postgraduate students who want to study and analyze thoroughly Estonian health care.

AROT.00.029 General Didactics

Department of Nursing Science

The essence of learning and teaching. The new paradigm of teaching. Developing students` learning and thinking skills. Methods of teaching. Educational psychology.

1 CP/1.5 ECTS

Lecturer D. Volmer

1 CP/1.5 ECTS

Professor P. Veski

2 CP/3 ECTS

2 CP/3 ECTS

2 CP/3 ECTS

APPENDIX XXII. CURRICULUM OF PHARMACY - DOCTORAL STUDIES (2008)

The volume of PhD study is 160 CP/240 ECTS, of which PhD study makes up 40 CP/60 ECTS and PhD research 120 CP/180 ECTS.

PhD study consists of speciality subjects (24CP/36ECTS = obligatory subjects 11CP/16.5 ECTS + speciality subjects 13CP/19.5 ECTS), general elective subjects (8 CP/12 ECTS), practice of teaching at university level (4 CP/6 ECTS) and optional subjects (4 CP/6 ECTS).

In conducting their research, PhD students are advised by the supervisor or the supervisor and cosupervisor(s) approved by the Council of the Faculty. PhD students' progress in research is evaluated once each academic year by an Evaluation Board. The requirements established for PhD theses are set out in the Statutes of Academic Degrees (adopted by the Council of the University of Tartu on 30th of November 2007)

SPECIALITY SUBJECTS (24 CP/36 ECTS)

A. Obligatory subjects (11 CP/16.5 ECTS), all specialities

Bioethics Workshop	2 CP/3 ECTS 9 CP/13.5 ECTS	Exam Prelim
3 CP/19.5 ECTS)		
Pharmacognosy Biosynthesis of Biologically Active Substances	4 CP/6 ECTS	Exam
Chromatography Pharmacology Pharmacotherapy and Drug	3 CP/4.5 ECTS 3 CP/4.5 ECTS	Exam Exam
I OXICOIOGY	2 CP/3 ECTS	Exam
bogy and biopharmaceutics		
Pharmaceutical Technology and Biopharmaceutics	5 CP/7.5 ECTS	Exam
Conventional and Modified- Release Formulations	2 CP/3 ECTS	Exam
Methodology of Clinical		
Drug Trials Pharmacology Pharmacotherapy and Drug	1 CP/1.5 ECTS 3 CP/4.5 ECTS	Prelim Exam
Toxicology	2 CP/3 ECTS	Exam
stry		
Pharmaceutical Chemistry Synthesis and Quality Control	4 CP/6 ECTS	Exam
of Active Substances Chromatography Pharmacology	1 CP/1.5 ECTS 3 CP/4.5 ECTS 3 CP/4.5 ECTS	Exam Exam Exam
Pharmacotherapy and Drug Toxicology	2 CP/3 ECTS	Exam
Social Pharmacy Methodology of Clinical	5 CP/7.5 ECTS	Exam
Drug Trials Modern Epidemiology	1 CP/1.5 ECTS 3 CP/4.5 ECTS	Prelim Exam
	Bioethics Workshop I3 CP/19.5 ECTS) Pharmacognosy Biosynthesis of Biologically Active Substances Chromatography Pharmacology Pharmacotherapy and Drug Toxicology ology and Biopharmaceutics Pharmaceutical Technology and Biopharmaceutics Conventional and Modified- Release Formulations Methodology of Clinical Drug Trials Pharmacotherapy and Drug Toxicology Stry Pharmaceutical Chemistry Synthesis and Quality Control of Active Substances Chromatography Pharmacotherapy and Drug Toxicology Social Pharmacy Methodology of Clinical Drug Trials Modern Epidemiology	Bioethics 2 CP/3 ECTS 9 CP/13.5 ECTS 9 CP/13.5 ECTS 3 CP/19.5 ECTS) Pharmacognosy 4 CP/6 ECTS Biosynthesis of Biologically Active Substances 1 CP/1.5 ECTS Chromatography 3 CP/4.5 ECTS Pharmacology 3 CP/4.5 ECTS Pharmacotherapy and Drug Toxicology 2 CP/3 ECTS Ology and Biopharmaceutics Conventional and Modified- Release Formulations Conventional and Modified- Release Formulations Methodology of Clinical Drug Trials 1 CP/1.5 ECTS Pharmacotherapy and Drug Toxicology 2 CP/3 ECTS Pharmacotherapy and Drug Toxicology 2 CP/3 ECTS Pharmacotherapy and Drug Toxicology 2 CP/3 ECTS 9 CP/4.5 ECTS Pharmacotherapy and Drug Toxicology 2 CP/3 ECTS 9 CP/4.5 ECTS

4. ARFR.03.016	Clinical Pharmacology	3 CP/4.5 ECTS	Exam
5. ARTH.03.030	Contemporary Method of		
	Investigations in Public	;	
	Health	1 CP/1.5 ECTS	Prelim

GENERAL ELECTIVE SUBJECTS (8CP/12 ECTS)

PRACTICE OF TEACHING AT UNIVERSITY LEVEL (4 CP/6 ECTS)

OPTIONAL SUBJECTS (4 CP/6 ECTS)

APPENDIX XXVII. CV-s OF ACADEMIC STAFF OF THE DEPARTMENT OF PHARMACY

- 1. Professor Peep Veski
- Professor Peep Veski
 Senior Lecturer Toivo Hinrikus
 Senior Lecturer Ain Raal
 Senior Researcher Vallo Matto
 Lecturer Daisy Volmer
 Lecturer Urve Paaver
 Lecturer Andres Meos
 Assistant Piret Kreutzwald
 Assistant Maaja Paavo
 Assistant Tea-Mai Tammaru

- 10. Assistant Tea-Mai Tammaru
- 11. Specialist Elmar Arak
- 12. Specialist Ulve Pihlik
- 13. Specialist (from 01.09.2009 lecturer) Karin Kogermann
- 14. Ph.D. Student (from 01.09.2008 assistant) Ivo Laidmäe

Name	Peep Veski
Date of birth	01/10/1950
Phone 1	+372737 5288
E-mail	peep.veski@ut.ee
Career	
Institution and position held	2008 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmaceutical Technology and Biopharmaceutics; Professor
	2003 University of Tartu, Faculty of Medicine, Department of Pharmacy; Professor
	1980-1981 - Assistant Professor, Institute of Pharmacy, University of Tartu
	1981-1986 - Senior Lecturer, Institute of Pharmacy, University of Tartu
	1986-1998 - Associate Professor, Institute of Pharmacy, University of Lartu
	head of the Institute of Pharmace, University of Tartu
Education	Semmelweis University - graduated in 1975, pharmacist
Administrative responsibilities	Member of Group of Experts 12 (Galenical Products) - European Pharmacopoeia
	Vice-Dean of the Faculty of Medicine - 01.02.1998-15.03.2002
	Member of the Executive Committee of European Association of Faculties of Pharmacy
	Member of several working group of European Federation for Pharmaceutical Sciences
	Expert of EMEA
	Member of the Commission of Pharmaceutical Terminology of the Ministry of Social Affairs, Estonia
	Reviewer of European Journal of Pharmaceutical Sciences
	Member of the Editorial Board of the "Ars Pharmaceutica" and "Euro Pharma Faculties News"
Degree information	Peep Veski, Doctor's Degree, 1994, (sup) -, Use of hard gelatin capsules and sodium alginates in peroral prolonged-release formulations (Use of hard gelatin capsules and sodium alginates in peroral prolonged-release formulations), Helsingi Ülikool
Honours & Awards	2006, Peep Veski; Honorary Member of the Hungarian Pharmaceutical Society
	2006, Peep Veski; Medal of the University of Complutense (Madrid)
	2003, Peep Veski; Correspondant Academicien of the Spanish Royal Academy of Pharmacy, 2003
Field of research	Health, Pharmacy
Dissertations under supervision	Ivo Laidmäe, PhD Student, (sup) Peep Veski, Trombiini ja fibrinogeeni sisaldavate haavaliimide immunoloogilistest omadustest ja nende omaduste tähendusest erinevates ravimvormides, University of Tartu
	Kaisa Naelapää, PhD Student, (sup) Peep Veski, Henning G. Kristensen, Poul Bertelsen, Vesipõhjalised latekskatted - filmi moodustumine ja erinevate katmisprotsessi parameetrite mõju barjääri omadustele (Aqueous latex

	coatings - studies on film formation and effect of processing conditions on the barrier properties),
	Natalja Genina, PhD Student, (sup) Peep Veski, Process-induced phase transformations (PITs) in manufacturinf of solid dosage forms, University of Tartu
Dissertations supervised	Karin Kogermann, Doctor's Degree, 2008, (sup) Peep Veski, Understanding Solid-State Transformations During Dehydration: New Insights Using Vibrational Spectroscopy and Multivariate Modelling, Faculty of Pharmacy, University of Helsinki Eve-Irene Lepist, Doctor's Degree, 2000, (sup) Peep Veski, Peroraalsed peptijdsed profarmakonid - stabiilsuse ja imendumise uuringud (Oral peptide
	prodrugs - studies on stability and absorption), Faculty of Medicine, University of Tartu
	Külli Teder, Master's Degree, 2006, (sup) Peep Veski, Angiotensiini konverteeriva ensüümi inhibeerivate raviainete antioksüdantsuse-põhine võrdlus (Antioxidativity-based comparison of ACE inhibitors), Faculty of Medicine, University of Tartu
	Piret Kreutzwald, Master's Degree, 1996, (sup) Peep Veski, Raviaine vabanemise kiirus ja kineetika kui peroraalsete tahkete ravimpreparaatide toime kestvust reguleerivad tegurid, Department of Pharmacy, Faculty of Medicine, University of Tartu
	Ivika Leik, Master's Degree, 1996, (sup) Peep Veski, Ravimi toime kestvuse reguleerimine kõvades zhelatiinkapslites ex tempore moodustuva kaltsiumalginaadi abil (Modification of drug release from hard gelatin capsules by calcium alginate forming ex tempore), Faculty of Medicine, University of Tartu
	Eve-Irene Lepist, Master's Degree, 1995, (sup) Peep Veski, Naatriumalginaadi geelistumise mehhanism ja pressimisjõu toime raviaine vabanemisele kõvadest zhelatiinkapslitest (Gel-forming mechanism of sodium alginates and influence of plug pressure to the drug release from hard gelatin capsules), Faculty of Medicine, University of Tartu
Additional information	Candidate of Biological Sciences Hungarian Academy of Sciences, 1980 University of Helsinki, 1994

Name	Toivo Hinrikus
Date of birth	10/19/1944
Phone 1	+3727375287
E-mail	toivo.hinrikus@ut.ee
Career	
Institution and position held	2008 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmaceutical Technology and Biopharmaceutics; Senior Lecturer 2003 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmaceutical Technology and Biopharmaceutics; Senior Lecturer In 1976-1980: assistant; in 1980-1981: senior teacher; in 1981-1992: docent; in 1992-1998: professor; since 1998 - Senior Lecturer.
Education	In 1964-1969: student at Tartu State University, diploma of pharmacist in 1969; in 1973-1976: postgraduate student at Tartu State University.
Administrative responsibilities	In 1990-1992: Head of the Chair of Pharmaceutical Technology and Chemistry; in 1993-1998: Head of the Chair of Pharmaceutical Technology and Biopharmacy; 1n 1993-1998: Head of Institute of Pharmacy; principal investigator for the Estonian Science Foundation Grant No. 1048 (1994-1997); Chairman of the Commission of the Pharmaceutical Terminology of the Ministry of Social Affairs, Estonia; Member of the License Committee of Ministry of Social Affairs, Estonia; Member of the Committee for Registration of Medicinal Products of Ministry of Social Affairs, Estonia; Head of programme of Pharmacists at Open University.
Degree information	Toivo Hinrikus, Doctor's Degree, 1978, (sup) Prof. Elise Käer-Kingisepp, Serotoniini toime uurimine küüliku pankrease välissekretoorsesse funktsiooni (Investigation of the serotonin action on the exocrine function of pancreas in rabbit), University of Tartu, Faculty of Medicine
Dissertations supervised	In vivo recovery of Factor VIII preparations KRYO-AHG and KOATE-HP in patients with hemophilia A. University of Tartu, Faculty of Medicine. Kaidi Vendla. Master`s Degree, 1997, (sup) Raul-Allan Kiivet, Toivo Hinrikus. Changes in drugs use in Estonia to the year 1994. University of Tartu, Faculty of Medicine. Ly Rootslane. Master`s Degree, 1997, (sup) Raul-Allan Kiivet, Toivo Hinrikus. The use of analgetics and psychotropics in the Tartu University Maarjamõisa Hospital in 1992 and in 1994. University of Tartu, Faculty of Medicine.
Additional information	Candidate of Biological Sciences Tartu State University, in 1978

Name	Ain Raal
Date of birth	07/16/1961
Phone 1	+3727375281
E-mail	ain.raal@ut.ee
Career	
Institution and position held	 1984 - Laboratory Assistant at the Department of Pharmacy of University of Tartu 1984-1990 - Assistant at the Department of Pharmacy of Tartu University (social pharmacy) 1990-1993 - Senior Lecturer at the Department of Pharmacy of Tartu University (pharmacognosy) Since 1993 up to now Senior Lecturer (Docent) at the Institute of Pharmacy of Tartu University (pharmacognosy) 2003 - 2007. University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management
Education	University of Tartu, pharmacist (1984)
Administrative responsibilities	Since 1984 - Participation in the research projects of the Department (later Institute) of Pharmacy in Tartu University. Studies about medicinal plants (phytochemistry), social pharmacy, history of pharmacy and folk medicine. The results on these studies are reflected in over 100 research papers, also in over 100 thesis and abstracts. Since 1990 - Creator and first editor-of-chief of national pharmacy journal "Eesti Rohuteadlane" ("Estonian Pharmacist"), since 2000 the member of editorial staff of journal 19941996 - A creator, editor and publisher of National Drug Catalogue Pharmaca Estica Since 1991 - An expert on herbal medicines in national drug regulatory authorities (Estonian Centre on Medicines, from 1993 Estonian State Agency of Medicines) 1997-2004 - A member of the expert group of the European Pharmacopoeia(phytochemistry) Since 1999 - A member of the expert comission of Estonian Pharmaceutical Terminology Since 2003 - Head of the Chair of Pharmacognosy and Pharmaceutical Organisation at the Department of Pharmacy of the University of Tartu 2004 - 2006 a member of the Council of Medical Faculty Since 2004 - an alternate member of Committee for Herbal Medicinal Products (HMPC)of EMEA in London. Since 2006 - a member of The Working Party on Community Monographs and Community List (MLWP) Since February, 2007 - the expert of Family Club in internet (www.pereklubi.com) Since 2007 - the member of the Editorial Advisory Board of The Open Agriculture Journal
Degree information	Ain Raal, Doctor's Degree, 1989, (sup) Elmar Arak, Eesti päritolu lõhnava kummeli farmakognostiline uurimine (The pharmacognostic investigation of Matricaria matricarioides of Estonian origin), Leningrad (Now St. Petersburg)
Honours & Awards	The Teacher of the Year 2006 of the University of Tartu (in Medicina)
Field of research	Health, Pharmacy (Pharmacognosy, phytochemistry, history of pharmacy,

ethnomedicine)

Additional information

Doctor's Degree: Candidate of Pharmaceutical Sciences (corresponds to Ph.D.) Institute of Chemistry and Pharmacy of Leningrad, U.S.S.R., 1989

Name	Vallo Matto
Date of birth	02/04/1969
Phone 1	+372737519
E-mail	vallo.matto@ut.ee
Career	
Institution and position held	2005 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmaceutical Technology and Biopharmaceutics; Senior Researcher
	1989-1991 and 1992-1993 Tartu University Clinics, Division of Child Psychiaty, hospital attendant
	1993-1997 University of Tartu, Department of Pharmacology, senior laboratory assistant and teaching assistant (part-time)
	1997-1998 University of Tartu, Department of Pharmacology, teaching assistant
	1999 University of Tartu, Department of Pharmacology, senior teaching assistant 1999–2001 University of Tartu, Department of Pharmacology, extraordinary senior
	2002 –2004 University of Tartu Department of Pharmacology senior teaching assistan
	2003 University of Helsinki, researcher (neurophysiology)
	2004-2005 University of Helsinki, senior researcher (neurophysiology)
Education	1976-1987 Tallinn 42th Secondary School, pupil
	September 1987 - June 1991 University of Tartu, Faculty of Medicine, student
	August 1991- January 1992 University of Helsinki, Faculty of Medicine, student January 1992 - June 1993 University of Tartu, Faculty of Medicine, student
	June 1993 - University of Tartu graduate, M.D. September 1993 - January 1998 University of Tartu, Department of Pharmacology, Ph.D. student
	June 3rd, 1998, University of Tartu, Dr. med.
Administrative responsibilities	2007 2nd BBBB Conference on Pharmaceutical Sciences (September, 2007), Scientific Secretary
	2001 2nd Baltic Regional Meeting of Biological Psychiatry (May-June, 2001) Secretary of the Orginizing Committee
	1995 Rudolf Buchheim Conference in Neuropharmacology (May, 1995) Member of the Orginizing Committee
Degree information	Vallo Matto, Doctor's Degree, 1998, (sup) Lembit Allikmets, Pharmacological studies on anxiogenic and antiaggressive properties of antidepressants, University of Tartu, Faculty of Medicine
Honours & Awards	2004, Vallo Matto; ESRS Poster Prize, Prague, October 2004, European Sleep Research Society 17th Congress
	2001, Vallo Matto; WFSBP Young Investigator Travel Award 2001
	2000, Vallo Matto; European College of Neuropsychopharmacology (ECNP) Fellowship Award, 2000
	2000, Vallo Matto; 1st Baltic Regional Meeting in Biological Psychiatry,

	WFSBP 1st Poster Prize, Vilnius, Lithuania, 2000
	1998, Vallo Matto; Lundbeck Eesti AS 1998 award in biological psychiatry (with MSc. Tatjana Skrebuhhova-Malmros)
	1997, Vallo Matto; "Ants and Maria Silvere and Sigfried Pant Memorial Scholarship at Tartu University Foundation" scholarship, 1997
	1997, Vallo Matto; The European Neuropeptide Club Award, 1997
	1997, Vallo Matto; 3rd Prize of the students competition organized by the Ministry of Education, Republic of Estonia, 1997
Field of research	Health, Pharmacy (Present research topics: Studies on the chemical, physicochemical, and biopharmaceutical properties of drug delivery systems (DDS): estimation and improvement of quality, PI Prof. P. Veski. The project covers the development of improved analysis methods for solid extended release DDS and investigations of the dissolution profiles of DDS manufactured in different countries (with emphasis on the DDS used for the treatment of gastro- intestinal ulcer and cardio-vascular diseases)
Dissertations supervised	Ruth Rudissaar, Doctor's Degree, 2006, (sup) Jaanus Harro, Lembit Allikmets, Vallo Matto, Neuropharmacology of atypical antipsychotics and an animal model of psychosis University of Tartu, Faculty of Medicine
Additional information	Doctor of Medical Sciences (Dr. Med.) University of Tartu, June 3rd, 1998

Name Date of birth Phone 1 E-mail	Daisy Volmer 11/13/1968 +3727375289 daisy.volmer@ut.ee
Career	
Institution and position held	2004 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; lecturer of social pharmacy 1997 - 2002 State Agency of Medicines, chief specislist 1993 - 2004 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Assistant 1992 - 1993 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; senior laboratory assistant
Education	1994 Master of Pharmacy
	 1992 - 1994 University of Tartu, Medical faculty, Institute of Pharmacy, master student 1987 - 1992 University of Tartu, Medical Faculty, Institute of Pharmacy, student 1976 - 1987 J. Köler 4-th Secondary School, Viljandi, pupil
Administrative responsibilities	 2007 European Society of Clinical Pharmacy 2006 Estonian Academical society of Pharmacy 1998 Expert Commission of Pharmacy Terminology 1990 Pharmaceutical Society of University of Tartu

Name	Urve Paaver
Date of birth	09/21/1958
Phone 1	+3727375282, +37256490280
E-mail	urve.paaver@ut.ee
Career	
Institution and position held	 2007 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; lecturer of pharmacognosy 2007 - 2007 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; extraordinary lecturer of pharmacognosy 2006 - 2007 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Researcher 2004 - 2006 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Assistant 1988 - 2004 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Assistant 1988 - 2004 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Assistant 1981 - 1988 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Assistant 1981 - 1988 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; senior engeneer- botanist
Education	2006 - 2006 University of Tartu, organic chemistry 1976 - 1981 University of Tartu, pharmacy 1965 - 1976 Tartu 5th High School
Administrative responsibilities	2006 Estonian Academical Society of Pharmacy, member of the board
Degree information	Urve Paaver, Master's Degree, 2006, (sup) Ain Raal, Uno Mäeorg, Eestis kasvava nõmm-liivatee eeterliku õli keemilise koostise analüüs ja droogi (Serpylli herba) vastavus Euroopa farmakopöa nõuetele (The analysis of the chemical composition of the essential oil of the wild thyme growing in Estonia, and the accordance of the herb (Serpylli herba) with the European pharmacopoeia standards), Institute of organic and biooeganic chemistry, Faculty of Physics and Chemistry, University of Tartu

Name	Andres Meos
Date of birth	04/08/1957
Phone 1	+372-7375197
E-mail	andres.meos@ut.ee
Career	
Institution and position held	I started to work as an assistant in Department of Pharmacy (now Institute of Pharmacy) of Medical Faculty of University of Tartu in 1984. In 1990 I continued the work in Department of Pharmacy as a senior teacher (lecturer) and starting from 1995 as a docent (assistant professor) on speciality of pharmaceutical chemistry. In 2000 I was appointed on the position of extraordinary senior assistant (lecturer) and in 2001 elected on the position of senior assistant, the position I hold up to the present time.
Education	University of Tartu, pharmacist (1981)
Degree information	Andres Meos, Candidate of Sciencies, 1986, academic supervisor Kyril Sergeyevich Rayevskiy, Влияние типичных и атипичных нейролептиков на дофаминэргическую систему мозга крыс. (Effect of typical and atypical neuroleptics on dopaminergic neuromediatory system of rat's brain), Academy of Medical Sciencies of USSR, Moscow
Field of research	Quality control of medicines, methodology of capillary electrophoresis and HPLC
Additional information	Doctor's Degree: Candidate of Biological Sciences (corresponds to Ph.D.), speciality: pharmacology Acadamy of Medical Sciencies of USSR., 1986

Name	Piret Kreutzwald
Date of birth	08/24/1971
Phone 1	+3727375284
E-mail	piret.kreutzwald@ut.ee
Career	
Institution and position held	2007 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmaceutical Technology and Biopharmaceutics; Assistant
	2006 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Researcher
	2006 - 2009 University of Tartu, Faculty of Medicine, Department of Pharmacy; Researcher
	1994-1996 pharmacist-analyst, State Agency of Medicines
	Since 1996 - assistant, University of Tartu, Institute of Pharmacy
Education	University of Tartu, 1994. Pharmacist.
Research activity	
Degree information	Piret Kreutzwald, Master's Degree, 1996, (sup) Peep Veski, Raviaine vabanemise kiirus ja kineetika kui peroraalsete tahkete ravimpreparaatide toime kestvust reguleerivad tegurid (Drug release and kinetics as factors controlling extent of drug absorption in case of peroral solid dosage forms), Department of Pharmacy, Faculty of Medicine, University of Tartu
Honours & Awards	Piret Kreutzwald; Annual premium of Estonian Pharmacist's Association, 1996.
Additional information	M. Sc. Pharm. University of Tartu, 1996

Name	Maaja Paavo
Date of birth	11/06/1948
Phone 1	+3727375294
E-mail	maaja@ut.ee
Career	
Institution and position held	 2005 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmaceutical Technology and Biopharmaceutics; Assistant 02/01/2008 - 09/01/2008 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmaceutical Technology and Biopharmaceutics; Assistant 1995 - 2000 The Dean's Office of Faculty of Medicine, Head of Dean's Office
Education	1967 - 1972 Pharmacy Department, Faculty of Medicine, University of Tartu
Administrative responsibilities	 2006 Member of the Estonian Academical Society of Pharmacy 1994 Member of the Board of the South Estonian Society of Pharmacy 1995 - 2000 The secretary of the Council of Faculty of Medicine 1991 - 1994 Estonian Association of University Women , secretary
Field of research	Health, Pharmacy (Using of the different increasing pH methods for dissolution test of modified release formulations. Immunomodulative effect of laser radiation.) Health, Pharmacy (The study of peroral modified-release drug delivery systems.)

Name	Tea-Mai Tammaru
Date of birth	04/21/1945
Phone 1	+3727375297, +37255654376
E-mail	tea-mai.tammaru@ut.ee
Career	
Institution and position held	 2007 – University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Assistant 2004 – University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; Assistant 1991 – University of Tartu, Faculty of Medicine; Assistant 1991 – 2004 University of Tartu, Faculty of Medicine; Assistant 1980 – 1991 Pharmacy "Raekoja" of Tartu; Director 1973 – 1980 Pharmacy of the District Policlinic of Tartu; manager 1971 – 1973 Pharmacy of Kursi; manager 1964 – 1966 Pharmacy of Elva; support worker
Education	2005 - Master of Pharmacy
	2004 – Master study in the University of Tartu, Faculty of Public Health (extern)
	1997 – 1998 – Continued education course at the University of Greifswald and Pharmacy Sheele in Germany.
	1989 – Pharmacist I category
	1966 – 1971 – University of Tartu, Faculty of Medicine, Department of Pharmacy; graduation as pharmacist (provisor).
	1960 – 1964 – Music-school of Children in Elva; Piano
	1953 – 1964 – Secondary School in Elva (book-keeping class)
Administrative responsibilities	 2007 – President of Society of "Vanemuine" mixed choir 2006 – Estonian Academical Society of Pharmacy; member 1994 – Society of Vanemuine; member 1994 - Union of mixed Choir in Estonia; member 2001 – 2005 University of Tartu, Department of Pharmacy; fire instructor 1972 – 1994 Society Pharmacy in Estonia; member
Degree information	Republic of Estonia Government Regulation No 120, 6 June 2005; qualification corresponds to degree - Master of Pharmacy
Honours & awards	2005 – Letter of Thanks of rector University of
	2005 – Letter of Thanks of Union Mixed Choir in Estonia
	1986 – Letter of Thanks of Town Government of Tartu
	1972 – 1991 many medals and honours certificates of Head Office Pharmacy
	1975 – Honour Certificate of Head Doctor of County
	1969 – Honour certificate and medal of Union of Medical Student Scientific Organisation
Field of research	Health, Pharmacy
Additional information	1991 – 2007 Supervisor of 68 course work, supervisor of 39 diploma work and reviewer of 25 research work

Name	Elmar Arak
Date of birth	01/28/1938
Phone 1	+3727375285
E-mail	elmar.arak@ut.ee
Career	
Institution and position held	2003 University of Tartu, Faculty of Medicine, Department of Pharmacy, Chair of Pharmacognosy and Pharmaceutical Management; specialist Establishment and managing of the Laboratory of Control Analysis of Tartu of Main Government of Pharmacies (19631979); Department of Pharmacy of the University of Tartu: assistant (19631979), chief teacher (19811986), docent (19861992), professor (19921997), docent (19972003), specialist (since 2003).
Education	Higher education from the Department of Pharmacy of the Medical Faculty of the University of Tartu, pharmacy 1962
Administrative responsibilities	 The managing of the Chair of the Pharmacognosy and Pharmaceutical Organization of the Department of Pharmacy of the University of Tartu, arranging of the scientific work, the furnishing of laboratories (19922003);- The initiator of the re-creation of the pharmacy of the University of Tartu, the member of the statute commission of the nowadays pharmacies of the University of Tartu, "Kesklinna" and "Tamme" (1993) and the member of the statute council of these pharmacies (19941998);Has taken part in the commission of the elaboration of the Medicinal Act and Regulation of the prescription of medicines (1993);The member of the initiative group for re-publication and editorial committee of the journal "Eesti Rohuteadlane" Member of the expert committee by the Ministry of Social Affairs of Estonia of the activity licencing of the Preparation and realization of the medicines (19901994);- The chairman of the Estonian Pharmaceutical Society (19861992) member of the advisory committee of the Medical Department of the University of Tartu (19921994). Has taken part in the preparation and managing of the pharmaceutical part of the days of Medical Department;-Member of the Ethical Committee on Human Studies by the University of Tartu (1992-2007);- Visit lectures by the Institute of Pharmaceutical Chemistry of the University of J.W.Goethe (Frankfurt 1993) and Department of Pharmacognosy of the University of Helsinki (1994).
Degree information	Elmar Arak, Doctor's Degree, 1980, (sup) -, Химико-фармакогностическое изучение ромашки аптечной, выращиваемой в Эстонской ССР. (Chemical and pharmacognostical investigation of Camomile cultivated in Estonia.), Leningrad Institut of Chemistry and Pharmacy
Honours & Awards	Awards from the University: 1. 1st place and the medal of the competition of the works, applied in the national economy (collaboration with I. Kruse and T. Hinrikus); 2. 2nd place on the medical field in the competition of the scientific works in 1988
Dissertations supervised	Katrin Pudersell, Doctor's Degree, 2006, (sup) Elmar Arak, Tropane alkaloid production and riboflavine excretion in the field and tissue cultures of henbane (Hyoscyamus niger L.), Arstiteaduskond, Tartu Ülikool Heidi Annuk, Doctor's Degree, 2002, (sup) Elmar Arak, Selection of medical

киткаа, bocor s begree, 1989, (sup) Elmar Arak, Eestr pantolu formava kummeli farmakogostiline uurimine, Leningrad Paaл, Айн., Doctor's Degree, 1989, (sup) Elmar Arak, Фитохимическое изучение ромашки душистой в Эстонии., Ленинградский химико- фармацевтический институт Riina Janno, Master's Degree, 1994, (sup) Elmar Arak, Tartu apteegikülastajate arvamustest, hoiakutest ja soovidest., Farmaatsia instit Arstiteaduskond, Tartu Ülikool Heidi Annuk, Master's Degree, 1998, (sup) Elmar Arak, Mõnede droogide vesitõmmiste in vitro toimed Escherichia coli ja Helicobacter pylori suhtes, Farmaatsia instituut, Arstiteaduskond, Tartu Ülikool Katrin Pudersell, Master's Degree, 1998, (sup) Elmar Arak, Peamiste tropaanalkaloidide ja taimetoiteelementide sisalduse uurimine taimes Hyoscyamus niger L., Arstiteaduskond, Tartu Ülikool Tiina Koppel, Master's Degree, 1994, (sup) Elmar Arak, Mõnede droogide baasil valmistatud ravimvormide antimikroobsest aktiivsusest, Tartu Ülikoo	ituut, , e pol,
Additional information Ph.D., Cand.pharm. Chemical-pharmaceutical Institute of Leningrad, 1982	2

Name	Ulve Pihlik
Date of birth	22/06/1946
Phone 1	+3727375 280
E-mail	ulve.pihlik@ut.ee
Career	
Institution and position held	Since October 2007 specialist In 1972-1995: assistant, junior research assistant, research assistant of Institute of Zoology and Botany of Estonian Academy of Sciences. In 1995-2007: head of experimental garden of Institute of Pharmacy, University of Tartu.
Education	1953-1964 Tartu 8th Secondary School, pupil
Degree information	Candidate of biological sciences (=PhD). Cand. Sc. thesis "Biological base of research of cowberry (<i>Vaccinium vitis-idaea</i> L.) and bearberry (<i>Arctostaphylos uva-ursi</i> (L.) Speng.) resources in pine forests in Estonia" (in Russian) defended in 1987 at the University of Tartu. Research supervisor dr. prof. N.A. Borisova (Chemical-Pharmaceutical Institute of Leningrad, Russia).
Field of research	Medicinal plant biology, ecology, resources, cultivation and genetic resources conservation.

Name	Karin Kogermann (neé Evendi)
Date of birth	12/05/1981
Phone 1	+372 56 509 455
E-mail	kkogermann@gmail.com
Career	
Institution and position held	2008 University of Tartu, Faculty of Medicine, Department of Pharmacy, Specialist
	2004 - 2008 University of Helsinki, Division of Pharmaceutical Technology; Ph D student; University of Tartu, Faculty of Medicine, Department of Pharmacy; Ph D student;
Education	2004 - 2008 – University of Helsinki, Finland, University of Tartu, Estonia; Ph D in Pharmacy
	1999 - 2004 – University of Tartu, the Faculty of Medicine, Magister of Pharmacy (cum laude)
	1987 - 1999 - Saku Gymnasium, secondary education (silver medal)
Administrative responsibilities	Member of TÜ Rohuteaduse Selts (Organisation of Pharmacy of Tartu University (1999-2004).
	Member of the Student Union of the University of Helsinki (Helsingin Yliopiskelijoiden Yhdistys, HYY), Finland (2004)
	Member of the Physical Pharmacy Society, Finland (2004)
	Member of the Farmasian Opiskelijoiden ja Tutkijoiden Yhdistys (FOTY), Finland (2004)
	Member of the Finnish Pharmaceutical Society (SFY), Finland (2004)
	Member of the Pharmaceutical Solid State Research Cluster (PSSRC) (2007)
	Member of the Estonian Academical Society of Pharmacy (EASP), Estonia (2007)
Degree information	Karin Kogermann, Doctor's Degree, 2008, Understanding solid-state transformations during dehydration: new insights using vibrational spectroscopy and multivariate modeling, University of Helsinki
	Karin Kogermann, Master's Degree, 2004, The levels of glutathione and vitamin C in population of Estonia, University of Tartu
Honours & Awards	2004-2008 SA Archimedes Grant for PhD studies at the University of Helsinki
Field of research	Health, Pharmacy
Dissertations under supervision	Sarita Hautala, Niina Heikkilä, Pharmacists (Bachleor Degree), 2008, (sup) Karin Kogermann, Kiinteän tilan muutuminen lääkevalmisteissa (Solid-state transformations in dosage forms), Division of Pharmaceutical Technology, Faculty of Pharmacy, University of Helsinki

Name	Ivo Laidmäe
Date of birth	06/02/1976
Phone 1	+372 737 4239
E-mail	laidmae@ut.ee
Career	
Institution and position held	2006 University of Tartu, Faculty of Medicine, Department of General and Molecular Pathology, Chair of Immunology; technician
Education	University of Tartu, pharmacist (2003)
Administrative responsibilities	Member of the Estonian Academical Society of Pharmacy (EASP), Estonia
Degree information	PhD student, (sup) Peep Veski, Raivo Uibo, Immunogenicity of fibrin glues, University of Tartu
Honours & Awards	2006, Centre of Molecular and Clinical Medicine; Symposium for young scientists 2006; 1st prize for best article
Field of research	Health, Pharmacy Health, Biomedicine (Immunology)

APPENDIX XXXI. LIST OF STUDY MATERIALS/TEXTBOOKS AND MONOGRAPHS IN THE LIBRARY OF THE DEPARTMENT OF PHARMACY

Institute of Pharmacy Library

Nooruse 1 50411, TARTU Tel: 7375 290 E-post: <u>hiie.villako@ut.ee</u>

Opening times:Monday, Tuesday9-19Wednesday, Thursday9-16FridayclosedJuly, Augustclosed

The library lends books for in-house use to all readers of the Tartu University Library. During study sessions, the personnel and students of the Institute of Pharmacy are preferred. The computer class holds 21 working places and 17 computers. Computers (wireless + Internet) can be used free of charge and printers and scanners for pay.

The library of the Institute of Pharmacy was established in 2006. The collection consists of study and research literature from different pharmaceutical fields. The collection is being renewed constantly. Most of the collection includes publications deposited in the Tartu University Library.

Recent publications are listed in the electronic catalogue ESTER, information about the full collection is available at the library.

List of Study Material

- 1. European Pharmacopoeia, 5th ed. vol. 1, 2. Strasbourg, Council of Europe, 2005
- 2. European Pharmacopoeia, 5th ed. Supplements 1-5. Strasbourg, Council of Europe, 2005 2006

3. European Pharmacopoeia, 6th ed. vol. 1, 2. Strasbourg, Council of Europe, 2008

- 4. European Pharmacopoeia, 6th ed. Supplements 1, 2. Strasbourg, Council of Europe, 2008
- 5. International Pharmacopoeia 2005, 4 ed. Geneva, World Health Organization, 2007

6. British Pharmacopoeia 2005 vol. I, II, III, IV, veterinary, compl. ed. CD. London, The Stationary Office, 2005

7. Martindale: The Complete Drug Reference, 35th ed. vol 1, 2. London, Chicago, Pharmaceutical Press, 2007

8. Unites States Pharmacopoeia 28. Rockville, The United States Pharmacopeial Convention, 2005

9. The Merck Index, 14th ed. New York, Merck & Co, 2006

10. Pharmaca Estica. Tartu, OÜ Pharmaca Estica, 2007 [in Estonian]

11. Государственная фармакопея СССР, XI изд. 1, 2 выпуск. Москва, Медицина, 1987, 1990 [in Russian]

12. Mark H. Beers, Robert Berkow. The Merck Manual, 17th ed. New Jersey, Merck & Co., 1999

13. USP DI 15th ed. vol. I. Drug Information for the Health Care Professional. Rockville, The United States Pharmacopeial Convention, 1995

14. USP DI 15th ed. vol. II. Advice for the Patient. Rockville, The United States Pharmacopeial Convention, 1995

15. Anne Marie W. Block [et al.]. DORLAND'S Illustrated Medical Dictionary, 31st ed. Philadelphia, Saunders, 2007

Pharmaceutical Technology, Galenical Pharmacy, Pharmaceutical Excipients, Physical Pharmacy, Biopharmaceutics, Drug Metabolism

1. P. Veski, L. Kirsch. Uuemad ekstraktsioonimeetodid. Tartu, Tartu Riiklik Ülikool, 1988 [in Estonian]

2. P. Veski. Ekstraktsiooni teoreetilised alused. Ekstraktsioon veeldatud gaasidega. Ekstraktsioon madalsagedusvõnkumisega. Tartu, Tartu Ülikool, 2006 [in Estonian]

3. P.Veski, M.Paavo. Ekstraktsioonimeetodid. Tinktuurid. Ekstraktid. Uusgaleenilised preparaadid. Tartu, Tartu Ülikool, 2006 [in Estonian]

M. Marvola, A. Urtti, J. Mönkkönen. Biopharmasia ja farmakokinetiikka. Fortis, 2007 [in Finnish]
 Robert L. Bronaugh, Howard I. Maibach. Percutaneous Absorption. Drug–cosmetics–

mechanisms-methodology, 3rd ed ., rev. and exp. New York, Basel, Marcel Dekker, 1999

6. Povl Krogsgaard-Larsen, Tommy Liljefors, Ulf Madsen. A Textbook of Drug and Development, 2nd ed. Australia [etc.], harwood academic publishers, 1996

7. Gilbert S. Banker, Christopher.T. Rhodes. Modern Pharmaceutics. New York, Basel, Marcel Dekker, 1996

8. E. Mathiowitz, D.E. Chickering III, C.-H. Lehr. Bioadhesive Drug Delivery Systems. New York, Basel, Marcel Dekker, 1999

9. Jens T. Carstensen. Drug Stability. New York, Basel, Marcel Dekker, 1995

10. Michael H. Rubinstein. Pharmaceutical Technology – Controlled Drug Release, vol 1. Chichester, Ellis Horwood, 1987

11. M. J. Groves. Parenteral Technology Manual. Interpharm Press, 1989

12. A. J.Winfield, R. M. E. Richards. Pharmaceutical Practice, 3rd ed. Edinburgh [etc.], Churchill Livingstone, 2004

13. P. Redfern. Chronotherapeutics. London, Chicago, Pharmaceutical Press, 2003

14. Raymond C. Rowe, Paul J. Sheskey, Paul J. Weller. Handbook of Pharmaceutical Excipients, 4th ed. London, Chicago, Pharmaceutical Press, American Pharmaceutical Association, 2003

15. A. T. Florence, D. Attwood. Physicochemical Principles of Pharmacy, 4th ed. London, Chicago, Pharmaceutical Press, 2006

16. M. E. Aulton. Pharmaceutics. The science of dosage form design, 2nd ed. Edinburgh [etc.], Churchill-Livingstone, 2002

17. Michael E. Aulton. Aulton's Pharmaceutics. The design and manufacture of medicines, 3rd ed. Edinburgh [etc.], Churchill-Livingstone, 2007

18. Patrick. J. Sinko. Martin's Physical Pharmacy and Pharmaceutical Sciences, 5th ed. Philadelphia [etc.], Lippincott Williams & Wilkins, 2006

19. Alfred Martin. Physical Pharmacy, 4th ed. Philadelphia [etc.], Lippincott Williams & Wilkins, 199320. J. T. Carstensen. Pharmaceutical Preformulation. Boca Raton [etc.], CRC Press, 1998

21. Leon Shargel, Susanna Wu-Pong, Andrew B. C. Yu. Applied Biopharmaceutics and Pharmacokinetics, 5th ed. New York [etc.], McGraw-Hill, 2005

22. Jennifer Dressman, Johannes Krämer. Pharmaceutical Dissolution Testing. Boca Raton [etc.], Taylor & Francis, 2005

23. H. Van de Waterbeemd [et al.]. Drug Biovailability.Estimation of solubility, permeability, absorption and biovailability. Weinheim, WILEY-VCH, 2003

24. Mario Grassi [et al.]. Understanding Drug Release and Absorption Mechanisms. A physical and mathematical approach. Boca Raton [etc.], CRC Press, 2007

25. Daan J. A. Crommelin, Robert D. Sindelar. Pharmaceutical Biotechnology. Australia [etc.], harwood academic publishers, 1997

26. Mohsen A. Hedaya. Basic Pharmacokinetics. Boca Raton [etc.], CRC Press, 2007

27. P. Langguth , G. Fricker, H. Wunderli-Allenspach. Biopharmazie. Weinheim, WILEY-VCH, 2004 [in German]

28. Binghe Wang [et al.]. Drug Delivery: Principles and Applications. New Jersey, WILEY-INTERSCIENCE, 2005

29. Wolfgang A. Ritschel, Gregory L. Kearns. Handbook of Basic Pharmacokinetics...including clinical applications, 6th ed. Washington, American Pharmacists Association, 2004

30. Nita K. Pandit. Introduction to the Pharmaceutical Sciences. Philadelphia, Lippincott Williams & Wilkins, 2007

31. Loyd V. Allen, Jr., Nicholas G. Popovich, Howard C. Ansel. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 8th ed. Philadelphia [etc.], Lippincott Williams & Wilkins, 2005

32. Michael E. Burton [et al.]. Applied Pharmacokinetics & Pharmacodynamics. Principles of therapeutic drug monitoring. Philadelphia [etc.], Lippincott Williams & Wilkins, 2006

33. Larry A. Bauer. Applied Clinical Pharmacokinetics, 2nd ed. New York [etc.], McGraw-Hill, 2008

34. Edward Kerns, Li Di. Drug-like Properties. Concepts, structure design and methods: from ADME to toxicity optimization. San Diego [etc.], Academic Press, 2008

35. Rajesh Krishna, Lawrence Yu. Biopharmaceutics Applications in Drug Development. Wien, New York, Springer, 2007

36. Johan Gabrielsson, Daniel Weiner. Pharmacokinetic and Pharmacodynamic Data Analysis. Concepts and applications, 4th ed. Swedish Pharmaceutic, 2007

37. Thomas N. Tozer, Malcolm Rowland. Introduction to Pharmacokinetics and Pharmacodynamics. The quantitative basis of drug therapy. Philadelphia [etc.], Lippincott Williams & Wilkins, 2006 **38.** Ю. Б. Белоусов, К. Г. Гуревич. Клиническая фармакокинетика. Практика дозирования лекарств. Москва, Littera, 2005 [in Russian]

Pharmacognosy

- 1. A. Kalda jt. Botaanika I. Tallinn, Valgus, 1965 [in Estonian]
- 2. K. Eichwald jt. Botaanika II. Tallinn, Valgus, 1970 [in Estonian]
- **3.** V. Masing jt. Botaanika III. Tallinn, Valgus, 1979 [in Estonian]
- 4. T. Kukk. Eesti taimede kukeaabits. Tallinn, Varrak, 2004 [in Estonian]
- 5. Toomas Kukk. Eesti taimestik. Tartu, Tallinn, Teaduste Akadeemia Kirjastus, 1999 [in Estonian]
- 6. Toomas Kukk, Tiiu Kull. Eesti taimede levikuatlas. Tartu, EMÜ, 2005 [in Estonian]

7. Malle Leht. Eesti taimede määraja, 2., par. ja täiend. tr. Tartu, EMÜ, Eesti Loodusfoto, 2007 [in Estonian]

8. J. Tammeorg, O. Kook, G. Vilbaste. Eesti NSV ravimtaimed. Tallinn, 1984 [in Estonian]

9. Ain Raal. Eesti põhiravimtaimed. Õppematerjal proviisoriõppe Avatud ülikooli üliõpilastele. Tartu, Tartu Ülikool, 2005 [in Estonian]

10. Ain Raal. Farmakognoosia I osa. Õppematerjal proviisoriõppe Avatud ülikooli üliõpilastele. Tartu, Tartu Ülikool, 2002 [in Estonian]

11. Ain Raal. Farmakognoosia II osa. Õppematerjal proviisoriõppe Avatud ülikooli üliõpilastele. Tartu, Tartu Ülikool, 2003 [in Estonian]

12. Ain Raal. Farmakognoosia eriosa. Õppematerjal proviisoriõppe Avatud ülikooli üliõpilastele. Tartu, Tartu Ülikool, 2005 [in Estonian]

13. Ain Raal. Tervist ja vürtsi maailma maitsetaimedest. Tallinn, Valgus, 2005 [in Estonian]

14. Ain Raal. Taimedes talletuv tervis. Tallinn, Valgus, 2003 [in Estonian]

15. Ain Raal, Kadri Odras.Väike ravimtaimede sõnastik: ladina, eesti, inglise, soome.Celsius Healthcare, 2006 [in Estonian]

16. U. Paaver, A. Raal. Droogide mikroskoopia. Tartu, Tartu Ülikool, 1995 [in Estonian]

17. U. Paaver. Ravimtaimede kultiveerimine. Tartu, Tartu Ülikool, 2002 [in Estonian]

18. U. Paaver, A. Raal, D. Volmer. Eestis kultiveeritavate ravimtaimede lühiiseloomustus. Tartu, Tartu Ülikool, 2000 [in Estonian]

19. A. Raal, D. Volmer, U. Paaver. Eestis kultiveeritavate ravimtaimede farmakognostiline lühiiseloomustus. Tartu, Tartu Ülikool, 2000 [in Estonian]

20. British Herbal Compendium. Vol 2. Bournemouth, BHMA, 2006

21. John Heineman. Heineman's Encyclopedia of Healing Herbs & Spices. New York, Reward Books, 1996

22. Claire Kowalchik, William H. Hylton. Rodale's Illustrated Encyclopedia of Herbs. Emmaus, Rodale Press, 1998

23. Г. П. Яковлев. Фармакогнозия. Лекарственное сырье растительного и животного происхождения. Санкт-Петербург, СпецЛит, 2006 [in Russian]

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27. Michael Heinrich [et al.]. Fundamentals of Pharmacognosy and Phytotherapy. Edinburgh [etc.], Churchill Livingstone, 2004

28. W. C. Evans. Trease and Evans' Pharmacognosy, 15th ed. Edinburgh [etc.], Saunders, 2000

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32. Oliver Kayser, Wim Qoax. Medical Plant Biotechnology, vol 1, 2. Weinheim, WILEY-VCH, 2007

33. В. Б. Алесковский. Физико-химические методы анализа. Практическое рукководство.

Ленинград, Химия, 1988 [in Russian]

34. James E. Robbers, Marilyn K. Speedie, Varro E. Tyler. Pharmacognosy and

Pharmacobiotechnology. Baltimore [etc.], Williams & Wilkins, 1996

35. Corrado Tringali. Bioactive Compounds from Natural Sources. Isolation, characterisation and biological properties. London, New York, Taylor & Francis, 2001

36. F. A. Tomás-Barberán, R. J. Robins. Phytochemistry of Fruit and Vegetables. Proceedings of the phytochemical society of Europe · 41. Oxford, Clarendon Press, 1997

37. E/S/C/O/P Monographs. The scientific foundation for herbal medicinal products, 2nd ed.,

completely rev. and exp. Stuttgart, E/S/C/O/P, Exeter, Thieme, 2003

38. Jean Bruneton. Pharmacognosy. Phytochemistry medicinal plants, 2nd ed. Hampshire, Intercept; Paris, Lavoisier, 1999

39. Steven Forster, Rebecca L. Johnson. Desk Reference to Nature's medicine. Washington, National Geographic, 2006

40. Joanne Barnes, Linda A. Anderson, J. David Phillipson. Herbal Medicines. A guide for healthcare professionals, 2nd ed. London, Chicago, Pharmaceutical Press, 2002

41. Rudolf Fritz Weiss, Volker Fintelmann. Herbal Medicine, 2nd ed., rev. and exp. Stuttgart, New York, Thieme, 2000

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History of Pharmacy, Ethics, Social Pharmacy, Pharmaceutical Management

1. H. Piirimäe. Tartu Ülikooli ajalugu l 1632-1798. Tallinn, Valgus, 1982 [in Estonian]

2. Karl Siilivask. Tartu Ülikooli ajalugu II 1798-1918. Tallinn, Eesti Raamat, 1982 [in Estonian]

3. Karl Siilivask, Hillar Palamets. Tartu Ülikooli ajalugu III 1918-1982. Tallinn, Eesti Raamat, 1982 [in Estonian]

4. Toomas Hiio, Helmut Piirimäe. Universitas Tartuensis 1632-2007. Tartu, Tartu Ülikooli Kirjastus, 2007 [in Estonian]

5. Ken Kalling. Tartu Ülikooli Arstiteaduskond. Tartu, Tartu Ülikooli Kirjastus, 2007 [in Estonian]

6. Toivo Hinrikus, Ain Raal, Hain Tankler. Farmaatsia Tartu Ülikoolis läbi aegade. Tartu, Tartu Ülikool Farmaatsia instituut, ([Tartu : Paar]), 2005 [in Estonian]

7. Ain Raal, Toivo Hinrikus, Hain Tankler. Pharmacy at the University of Tartu. Tartu, Tartu Ülikool, ([Tartu : Paar]), 2006 [in Estonian]

8. Ain Raal. Tervist ja vürtsi maailma maitsetaimedest. Tallinn, Valgus, 2005 [in Estonian]

9. Daniel Goleman. Emotsionaalne intelligentsus. Tartu, Väike Vanker, 2000 [in Estonian]

10. Daniel Goleman. Töö emotsionaalse intelligentsusega. Tartu, Väike Vanker, 2001 [in Estonian]

11. Dietrich v. Engelhardt. Eetika meditsiini argipäevas. Tartu, Tartu Ülikooli Kirjastus, 2002 [in Estonian]

12. George Butterworth, Margaret Harris. Arengupsühholoogia alused. Tartu, Tartu Ülikooli Kirjastus, 2002 [in Estonian]

13. Talis Bachman, Rait Maruste. Psühholoogia alused, 2. täiend. trükk. Tallinn, Ilo, 2003 [in Estonian]

14. Mari Meel. Ärieetika. Sissejuhatus ärieetikasse. Tallinn, Külim, 2003 [in Estonian]

15. Lois P. Pojman. Eetika. Õiget ja väära avastamas. Tallinn, Eesti Keele Sihtasutus, 2005 [in Estonian]

16. Sam Salek, Andrew Edgar. Pharmaceutical Ethics. Chichester, John Wiley & Sons, 2002

17. Robert M. Veatch, Amy Haddad. Case Studies in Pharmacy Ethics. Oxford, New York, Oxford University Press, 1999

18. Tom L. Beauchamp, James F. Childress. Principles of Biomedical Ethics, 5th ed. Oxford, Oxford University Press, 2001

19. Maailma Arstide Liit. Arstieetika käsiraamat. Tartu, Elmatar, 2007 [in Estonian]

20. Talis Bachman, Rait Maruste. Psühholoogia alused, 2. täiend . tr. Tallinn, Ilo, 2003 [in Estonian]

21. Dylan Evans. Emotsioon. Sentimenditeooria. Tallinn, Valgus, 2002 [in Estonian]

22. Beth B. Hess, Elizabeth W. Markson, Peter J. Stein. Sotsioloogia. Tallinn, Külim, 2000 [in Estonian]

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APPENDIX XXXIV. OPINIONS OF PROFESSIONAL ORGANIZATIONS

EESTI APTEEKRITE LIIT

ESTONIAN PHARMACISTS ASSOCIATION

Prof Peep Veski Department of Pharmacy Tartu University

10 June 2008

The Estonian Pharmacists Associations opinion about the Tartu University pharmacy curriculum, personnel and graduates.

We are glad to note, that the curriculum has many strong sides:

- Undergraduate program in pharmacy has been compiled according to the recommendations on pharmaceutical education at higher education institutions and experience of several other countries.
- Preservation of the course system and the logical order of subjects.
- Higher proportions of medicinal subjects.
- Teaching of speciality subjects starts from the 4th term.
- Direction towards pharmacy-specific education.

Although the amount of medicinal subjects has risen in the past years, there is still quite insufficient proportion of clinical disciplines in the curriculum. During the past three years a transition toward problem-based teaching has occurred. Due to the larger number of seminars, this problem can be partly solved with discussions in seminars. We welcome the new subject- Primary Care Medicine in the II term of curriculum.

In most pharmacies the ATC-classification is used, therefore we suggest to use the same medicines classification system also while in teaching students. In the past the subject Recognition of Goods was incorporated to curriculum, where students familiarized themselves with medical preparation dispensed in pharmacies. Now they meet specific preparations first during practical training in pharmacy.

We regard very important the introduction of a new block of disciplines, Clinical Pharmacy, and also implementing an obligatory course on Drug toxicology in teaching curriculum of the pharmacy students.

As further employers, we have noticed difficulties in conversation and serving patients due to the lack of insufficient estonian language skills. Because the number of students on courses is relatively small, we suggest to perform oral exams also in the future. We are convinced that only during a conversation one can get a true picture how familiar the student is with speciality terminology, his/her general orientation skills in pharmaceutical sciences, capability to associate different aspects etc.

As a strong side we would like to notice the openness, readiness to learn and good computer-skills of students.

Practical Vocational Training

Training takes place outside the University and is carried out during the fall term of the 5th year. Training can be carried out in different pharmaceutical establishments. It comprises different parts: dispensing medicines (OTC and Rx), pharmaceutical technology, pharmaceutical chemistry (analysis), pharmaceutical management.

The majority of students are trained in the two University pharmacies, located in Tartu. In our opinion only larger pharmacies with broader nomenclature and skilled pharmaceutical personnel can serve as training bases. Therefore we recommend to use as a teaching base only pharmacies where there are possibilities to reach all goals of practical training.

Teaching staff

For teaching staff, there are 17 positions in the Department of Pharmacy, including 1 professor, 2 docents and 6 assistants. For teaching social pharmacy, also external specialists are used. It would be necessary to use more practicing specialists. We are aware of difficulties in finding appropriate teaching staff because of a lack of pharmaceutical personnel. Such situation doesn't favor academic movement. In order to diminish isolation, guest lecturers who would share pedagogic, scientific and practical experiences, should be invited to the Department as often as possible.

University equipment

In order to facilitate the complete fulfillment of the curriculum described in the Directive 85/432/EEC art 2(5) the Department of Pharmacy has dramatically improved its teaching facilities and equipment. Compared to the old premises, Department has now more technical facilities and comfortable learning conditions for students and teaching staff. Thanks to the Departments library, there are more possibilities for the investigation of different pharmaceutical databases and information sources. We would like to stress the possibility to practice social pharmacy and improve medicines dispensing skills in "pharmacy class". There are immense possibilities in improving students knowledge in different medical situations, identifying medical problems and making evidence-based decisions.

Further education and cooperation

Estonian Pharmacists Association has organized in cooperation with Tartu University continuing education courses. Although in Estonia the continuing education system is not mandatory, there is still interest in further post-graduate training among community pharmacists. In this matter further cooperation between Association and Department is needed.

Kaidi Sarv Head Pharmacist



Estonian Society of Hospital Pharmacists J. Sütiste st. 19 Tallinn 13419 28.05.2008

Prof. Peep Veski

The following is an Estonian Society of Hospital Pharmacists opinion of the pharmacy education in the University of Tartu.

Pharmacy education should prepare pharmacists to provide patient-centred care that optimizes medication therapy. Pharmacists must have an in-depth knowledge of medications and the biomedical, sociobehavioral, and clinical sciences and the ability to apply evidence-based therapeutic principles and professional issues to contemporary pharmacy practice. As other health care professionals, pharmacists must be educated to deliver patient-centred care as members of an interprofessional team, emphasizing evidence-based practice.

As experts regarding medication use, pharmacists must be responsible for rational use of medications and promotion of wellness, health improvement, and disease prevention and be the resource for

unbiased information and advice regarding the safe, appropriate, and cost-effective use of medications.

Despite of the recent changes in the pharmacy curriculum, we find that the current pharmacy education in the faculty of pharmacy does not always reflect the contemporary hospital pharmacy practice.

The current graduates of the faculty of pharmacy have a sufficient knowledge in the basic sciences and are willing to improve their clinical knowledge by practice but they lack the abilities to identify the medication problems and to make evidence-based decisions, required in the practice of hospital pharmacy.

As one of the important tasks of the hospital pharmacists is to respond to drug information inquiries, the curriculum should teach more intensively the skills how to retrieve drug information, the ability to judge the reliability of various sources of information and to utilize clinical and scientific publications in clinical care decision-making and evidence-based practice. The previously mentioned tasks are also important

in developing and analyzing clinical drug guidelines and participating in the formulary process, which is often the task of the hospital pharmacist.

The faculty should use more teaching and learning methods that foster the development and maturation of critical thinking and problem-solving skills and enabling students to transition from dependent to active, self-directed, lifelong learners. The development of critical thinking and problem-solving skills should be supported through case studies, guided group discussions and other practice based exercises – the methods that are at the moment used by a limited number of teachers.

We would like point out the importance of written and interpersonal communication skills. Pharmacists have to collaborate and interact with other health care professionals as a member of a team and communicate with patients and other health care providers. Those skills of current pharmacy graduates are unfortunately insufficient.

The accessibility and availableness of contemporary and up-to-date information is elementary in every educational institution. In our opinion the pharmacy faculty lacks the material and human resources and educational materials for teaching clinical subjects. Students lack the access to online journals, databases, and other resources that support the teaching program. We suggest involving more practising hospital pharmacists into teaching process in the faculty.

The faculty is currently not involved in postgraduate professional education and training of pharmacists and promotion of the lifelong education. We find that the faculty should foster professionalism and promote development of interprofessional learning and collaborative practice.

Finally, we hope that the pharmacy faculty will establish a closer relationship between the hospital pharmacists association and collaborate for developing the vision for the future of contemporary pharmacy practice.

Irja Uiboleht,

Estonian Society of Hospital Pharmacists Member of the board

APPENDIX XXXV. JOINT FINAL REPORT OF THE ACCREDITATION EXPERT TEAM, 2001

Estonian Higher Education Accreditation Centre

Joint Final Report The University of Tartu

Programmes assessed 6505202 Pharmacy / Masters 8505202 Pharmacy / Doctorate <u>Visit dates</u> 25/26 April 2001 <u>Expert Team</u> Prof. Graham Sewell (Team Chairperson) Dept. Pharmacy and Pharmacology University of Bath Bath BA2 7AY United Kingdom Email prsgjs@bath.ac.uk

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Part 1

General Overview

The Higher Education Quality Assessment Centre of Estonia has invited three experts from the United Kingdom, Sweden and Finland to conduct a review and make recommendations on two pharmacy programmes at Tartu University. The programmes fall into the study domain of Medicine, and teaching is provided by the Department of Pharmacy and by other Departments in the Faculty of Medicine.

The Team was asked to evaluate two study programmes. The Master degree in Pharmacy (code 6505202), a 5 year programme including 6 months of pharmacy practice, and the 4 year Doctorate degree (code 8505202).

The expert team (the Team), visited the University on 25 and 26 April 2001. The Team met, and personally interviewed, the Dean of the Faculty of Medicine, the Vice Dean and Head of the Department of Pharmacy, and members of academic staff representing each subject group. The Team also interviewed groups of students from both Masters and Doctorate programmes. During its review, the Team visited the Department of Pharmacy at Tartu University, and the Biomedicum, which includes pre-clinical departments with responsibility for teaching components of the pharmacy programme and the State Pharmaceutical Agency. The Team also visited a University pharmacy, where students receive training in pharmacy practice.

The Team recognises that the Pharmacy Department is in a state of transition from traditional teaching based on Russian ideology, to a more European approach. It was also accepted that difficulties with language, particularly the limited availability of key texts in Estonian, and the paucity of pharmaceutical industry in Estonia, were potential limiting factors in the development of pharmacy education and research. Also, the Team were made aware of ambitious plans for the development of a new hospital and incubator village on a site next to the new Biomedicum building. The possibility of relocating the Department of Pharmacy to this new site could present exciting opportunities for the future.

At the conclusion of the visit, the Team conducted an informal exit interview with the Dean and the Vice-Dean / Head of Pharmacy. The Team asked for clarification on a number of issues, and presented its findings and opinions from the evaluation. The discussion was conducted in an open and constructive manner, and the Team thanked members of the University for their help and cooperation during the evaluation process.

The following report comprises the findings of the Team (Part 2), general recommendations (Part 3), and finally the accreditation conclusions and recommendations (Parts 4 and 5). Part 2 of the report is structured in accordance with the Requirements for Accreditation of Educational Programme of University, approved by the regulation of the Minister of Education No. 34 of 14 December 1998.

Part 2

Findings

The following part includes the findings of the team covering structure and management of educational policy, students and study program, the educational process followed by organisation of studies and quality assurance.

The findings are based on the self/study report, supplementary material received during the visit and observations during the two days visit to Tartu University which includes interviews and analyses of different elements of the pharmacy programme including textbooks, course materials, course outlines, diploma work and masters and doctoral thesis. The following findings are a result of an analysis of all material and discussion among the members of the Team.

I. Structure and Management of Educational Policy

The aims and objectives of the programmes

According to our view the goal/setting might best be regarded as a process, (a communication process) rather than in terms of a set of formulations. However, for an organisation to work efficiently any organisation needs negotiated and agreed formulated goals.

We have identified formulated goals on five levels.

- 1. The goals of the University of Tartu (TU).
- 2. The goals of the Medical faculty and its educational programmes
- 3. The goals of the Masters pharmacy programme and the Doctorate pharmacy programme
- 4. The goals at the subject level, e.g., biopharmacy for Masters programme
- 5. The goal of specific courses

There is a co-ordination of the goals. However, the co-ordination is undertaken in an informal process where the Dean is responsible for the goals at the second and third level, and the Head of department of pharmacy, for the second, third, fourth and fifth levels. The role of representatives of the teachers and the students is unclear. This means that the goals for the programme as a whole are not clear. The Team believe that a more active interaction among the involved parties could also motivate the teachers and the students more.

The Team suggests the establishment of two programme committees for the Pharmacy Masters programme and Pharmacy Doctoral programme may facilitate and encourage such interactions. Currently, the representatives at the subject level are given great freedom to formulate their own goals. This might encourage teachers to continue to teach in rather conservative fashion whereas a revision of the topics and the teaching methods should be considered. The establishment of programme committees might encourage more co-ordinated innovations in the pharmacy education.

The programme committees could also consider revision of instructions, plans, policies and procedures. Plans, policies, and procedures exist, although these must be considered to be legitimate and relevant by the parties involved (e.g., teachers and students). To ensure this is the case, the parties involved must have had the opportunities to influence them. By such a process the plans and policies might act as motivational factors and compliance with procedures encouraged. Although academic staff are involved in management and development processes, these could be more efficient and transparent.

I. Students and study programmes

Interviews

The team met two groups of master students from the 3rd and 4th year of the pharmacy program and three Ph.D. students. The general conclusion from the meeting with the students was that they were satisfied with the quality of teaching and examination. However, concern was raised about access to modern textbooks. Some students wanted more books in their own language while some other younger students wanted English textbooks. Although the teaching staff had access to new textbooks

in English, these should be more widely available to the students. The two groups also had different opinions about studies abroad where the younger students were more positive. Almost all master students were hesitant to continue to a Ph.D. programme. The explanation was that the salaries in the university were too low to make the effort. The team is very concerned about this situation.

The three Ph.D. students were in different stages of their studies and also represented different subjects. All three showed a high self motivation, high quality and independence. These young graduate students could be of great importance to the Department of Pharmacy.

Admission quotas, student numbers

An analysis of the number of students admitted to the pharmacy programmme during the years 1998 2000, appendix XVI, shows that the number of applicants is increasing while the available places are about the same, about 30. Together with the prognosis made in, appendix XVII, and from the interviews with students and staff it seems that admission quotas should be increased to a future need of pharmacists in the society.

Entrance requirements

Based on the interviews with students and teachers it seems that the educational level of the entrance students is adequate and corresponds to the requirements. However, the content of the program is not clear to all students when they enter the programme and some students were not satisfied with the present counselling system.

Educational level, drop out and completion rate

Most of the students show high motivation and satisfying results according to the teachers. During the studies the students and teachers relate in a very positive way with a strong involvement of the teachers. The students seem to be satisfied with the study load and help from the teachers. However, the drop-out rate of almost 30% is surprising and was a concern for the Team.

Monitoring of achievements, evaluation methods

The achievements of the students are monitored and evaluated. The students give their comments in an evaluation sheet after each course. Also the oral examination process enables the teaching staff to monitor the performance and quality of the students. The students were satisfied with this type of examination . Analyses of this evaluation and the use of these data to assist in the development of the curriculum could be improved.

Student mobility

Inside the faculty of medicine it is possible for the students to change and transfer credit points between different units. However, between faculties transfer is almost impossible.

Comparison to foreign universities

It is difficult to compare the teaching programmes between different countries. The present situation in Estonia concerning production, development and control of drugs will influence the curriculum of the pharmacy programme . However, it is also necessary to plan for a future pharmacy programme which includes the changing needs of pharmacy and a more westernised system of practice. It is unclear to the Team if the department recognises credits awarded by foreign universities.

Practical training

The team visited the university pharmacy where the students are trained in practical pharmacy. The students are trained in different aspects of the work in a pharmacy e.g. extemporaneous preparation, OTC medicines etc. The Team found that the teaching and the facilities were of a high quality and that training was well planned.

III. Educational process

Teaching is based mainly on lectures and modern methods such as problem - based learning are used only to a limited extent. The teachers seem to be interested but require more time for creating new teaching material and text books in the Estonian language. The Team observed, however, that the teaching material varied in quality.

To meet the future challenges of developments in the practice of pharmacy, a programme of life long learning for pharmacists working in different pharmaceutical fields is necessary. This was provided through the Centre for Continuing Medical Education in the Faculty. The Team recommends contact with the Estonian pharmaceutical organisations to co-ordinate such efforts. Also contact could be established with international organisations such as The Swedish Academy of Pharmaceutical Sciences.

IV. Organisation of management, studies and resources

Subjects

The team consider the division of the educational programme into subjects is appropriate to the needs of pharmacy practice. Using the resources of the other departments of the medical faculty increases efficiency .Also joint education of pharmacy and medical students will benefit both professions and foster closer collaboration.

However, as mentioned in the self – evaluation report, a more active collaboration between the different subject areas could make the education and research more efficient. Currently, the quality of the research varies between different subjects. More active collaboration, in the form of more joint research projects ,could increase the scientific standards of research in the areas now lagging behind and may also lead to a more efficient use of equipment.

Teaching staff

The social atmosphere in the department and in the pharmacy education is open, informal, friendly and empathic. The same seems to be true of the relationship between the staff and the students.

Students were content with the teaching quality although the Team is concerned about the relatively low involvement of staff in research. In the interviews a majority of the teachers considered this limitation to be caused by the heavy load of teaching. However, when asked the about international research in their respective subjects there seemed to be a limitation in their present knowledge about both educational and research programs in other countries. The students expressed concern about the lack of information about possible research projects that they could be involved in. To be able to develop and change the curriculum it is very important for the teaching staff to be more involved in the international research scene and to use this to influence the masters students to continue into a Ph.D. programme. The younger staff and assistants, could communicate very well in English and showed a high academic quality with a great potential for the future.

Teaching combined with research

The team wants to stress the importance of research for maintaining a high scientific level in the master and Ph.D. education. and the staff should be encouraged to develop their research interests. This might increase the motivation and skills for their educational tasks. The research may also be regarded as an important measure in the recruitment of new staff members. Research is also a precondition for high education standard.

Currently, some of the teaching staff seem to be pre-occupied with the task of providing education and education materials with the result that their research suffers. In the long run it is the greatest importance for the teachers to undertake research beside their educational tasks. Partly this reflects a lack of resources but not entirely. To some extent resources could be reallocated to make it possible for teaching staff to undertake more research of high quality. However, the teaching staff must be supported in their efforts to undertake research by being given the opportunity to establish contacts with other research teams both inside and outside Estonia. Measures to address the lack of modern equipment should be undertaken.

Furthermore, a large number of available staff positions are vacant. The vacancy of second chair in the Department of Pharmacy was of particular concern. It seems that the salary of the staff is dependent on the number of teaching hours. This may discourage changes in teaching practice which could make more time available for research. Also, the connection between salary and the number of teaching hours may discourage the development of text material.

The number of Doctoral students in the department is limited by the number of research supervisors available. In the long term, supervisors in all subjects of the curriculum should be available in the Department.

The content of the programme

The Team is aware that there is a planned change from more traditional chemistry – related subjects to new subjects such as clinical pharmacy, pharmaceutical care, social pharmacy and more biological/medical subjects. We support this development. However, to this it is necessary to reconsider the overall balance of the programme and the allocation of credit points for the individual courses.

The teaching and learning methods

Increasing attention is given to the development of problem based learning methods, e.g., by using case studies in the pharmacotherapeutics course. The Team approved of these developments . When more material becomes available in the Estonian language the number of hours allocated to lectures might be diminished to allow introduction of new teaching methods. Ph.D students, Assistants and other teaching staff should be encouraged to participate in pedagogical courses.

The evaluation of students achievements

This will be discussed under the heading of quality assurance below.

Facilities

The Pharmacy Department located in the old university building is not of a satisfactory standard. New equipment is lacking, the ventilation system is below acceptable standard and the fabric of the building is poor. The Team are aware of the possibility that the Department of Pharmacy may relocate to new facilities near to the Biomedicum in the future .

The libraries need to be extended in terms of scientific journals and scientific textbooks. A library for students in the Pharmacy Department is lacking.

External relations

The Pharmacy Department has a number of contacts within professional bodies in Estonia and outside Estonia. However, more members of the staff could be involved in the development of external relations. Sabbatical periods might be used for this purpose.

International student contact exists , mainly through the European Pharmacy Students Society, but this can be extended in the form of participation in European exchange programs.

An external advisory board with members from different pharmaceutical bodies in Estonia might facilitate the external contacts. There are also a need for increased international contacts in the form of visiting professors. A Departmental webpage in English could encourage international contacts.

V. Quality assurance

Internal quality evaluation

There is a system of internal evaluation based on data from student evaluations and evaluations from teachers. However, the evaluation should be more systematic. Every year experiences from each subject area are collected .The Team sees a risk that too much importance could be given to the evaluation by students if there is no systematic data about the other aspects of education quality, including the students achievements and results based on assessments by teaching staff.

The two committees suggested under the heading of Structure and management of education policy could also be involved in the internal qualitative evaluation. Information which is collected could be used to be considered for innovations and changes in the curriculum, the content of the courses, the education methods and the way assessment of the educational goals are measured.

Administrative efficiency

It seems that administration of the Pharmacy Department and the pharmacy program is efficient . It may, however, be possible to undertake measures to increase the administrative efficiency of the pharmacy education process.

Procedure for curricular innovations

The opinion of the Team is that two proposed committees could facilitate the introduction of innovations in the curriculum, the teaching methods and the content of the courses. The introduction of innovations requires discussions and judgements to ensure potential innovations are in line with the goals of the pharmacy programmes and the needs of Estonian pharmacy.

The introduction of innovations requires reconsideration of existing courses and their content. These are difficult decisions because the teaching staff have made investments in terms of knowledge and teaching materials. Also innovations may require new equipment and the incorporation of new knowledge into the organisation. Innovations may be introduced on a preliminary basis, perhaps as an elective course, before the courses are incorporated as core subjects.

It is the Teams opinion that a number of new courses could be considered, e.g, clinical pharmacy and psychology. These courses might be introduced without significant increase in cost by collaboration with the hospital pharmacy and the departments at the TU. Also, we support the intention to engage personnel at the university pharmacy as teachers on the pharmacy programme. Common research projects could be used to strengthen the ties between the university pharmacy , hospital pharmacy and pharmacy and pharmacy education.

The Team has become well aware about the extensive contacts between representatives of the TU pharmacy program and other units of Estonian pharmacy sector. The team will stress the importance of such contacts in the efforts to satisfy the pharmacy labour market, the professional satisfaction of individual pharmacies and scientific level of pharmacy in Estonia.

Part 3

General Recommendations

The Team offers the following recommendations to the University of Tartu, the Faculty of Medicine and the Department of Pharmacy. These are offered as constructive suggestions, and should be considered in addition to the the official findings set out in Part 2. The recommendations are not given in any particular order of priority:

- Programme Committees should be established for both Pharmacy Masters and Doctoral programmes. These could lead the formulation of clear and realistic goals for the pharmacy programme based on systematic analysis of the strengths and weaknesses pertaining to pharmacy in Estonia (eg: the weak pharmaceutical industry sector). The Committee's would encourage greater involvement of teachers and students in the development of the pharmacy education and could also consider the revision of instructions, plans policies and procedures (criteria 1 in the "requirements for accreditation").
- Motivation of staff might be encouraged by their involvement in the above Programme Committees, and by enabling them to influence planning and policy-making decisions. Although such interactional processes currently exist, these could be made more efficient and transparent.
- Consideration should be given to harmonising the Estonian credit points system (40 credits per study year), with the European Credit Transfer System (60 credits per study year). Although it is possible for students to transfer using adjustment formulae, this may discourage foreign universities from recognising the transfer equivalence of credits gained in Estonia.

- Establish a Research Committee in the Pharmacy Department to develop a strategic approach to research. This could work in concert with the Programme Committees (above) to ensure teaching is informed by research, and also with professional societies to ensure that the research needs particular to Estonian pharmacy are met. The Research Committee should report to Faculty level to enable integration of pharmacy research with other research interests in the Faculty of Medicine.
- Provide more emphasis to the personal development needs of academic staff, particularly to encourage research activity and to prepare staff for more senior positions as the Department develops and to replace staff reaching retirement age.
- Address difficulties in recruitment of academic staff through joint appointments with pharmacy practice. This is currently under consideration in the case of community pharmacy, but could also be extended to hospital pharmacy and, with overseas collaboration, to industrial pharmacy.
- Current efforts to move the balance of the Masters course from a "chemistry" bias to a more equal balance with medical and clinical subjects should continue.
- The process of admitting students to the Masters course could be improved by ensuring candidates are better informed of the programme contents and the career opportunities for practising pharmacists. It may be helpful to add to the Department of Pharmacy's existing "open day" initiative by the provision of information leaflets to gymnasium school students and by school visits by Pharmacy students. Some European countries also interview candidates to assess suitability, commitment and interest in pharmacy.
- Provide tuition in the English language for Year 1 students with limited ability in English. Particular emphasis should be placed on the use of key texts written in English.
- Continue the development of student group work and problem based learning. An excellent example of this approach to learning already exists in the teaching of pharmacotherapeutics using case studies. This approach could be translated to other subject areas.
- Encourage more graduates from the Masters course to continue with Doctoral studies. This is vital to meet the educational and research needs of pharmacy in Estonia.
- Modern equipment is urgently required to support both teaching and research in the subject areas based in the Department of Pharmacy (as opposed to the Biomedicum). Priority should be given to equipment which could be shared between subject areas in collaborative projects (eg liquid chromatography equipment).
- Some subject areas (eg. pharmacognosy and pharmaceutical chemistry) are need of
 modernisation and need to be re-focussed to develop research interests which are recognised
 as novel and of high quality by the international research community. Such research should
 also be used to inform teaching in these areas.
- Collaboration in both teaching and research with foreign institutions should be further developed. This could be encouraged through exchange programmes, travel fellowships in teaching and research, sabbatical leave for key members of staff, and through collaborative research programmes.
- Research activity should be increased significantly. Some means of achieving this are discussed in these recommendations, but staff motivation and the expectations of the University in terms of research output from its staff are also crucial.
- Involve external professional pharmacists (representing community, hospital and industrial practice) in a regular review of the Masters programme to ensure that the course meets the needs of pharmacy practice in Estonia. This could be achieved through membership of, or co-option onto the Programme Commitees.
- The arrangements for student counselling should be reviewed and strengthened if necessary.

- A more systematic approach to the analysis of feedback from students and staff should be implemented, together with a system for feedback of results and the implementation of of change.
- Courses for new subject areas (eg. clinical pharmacy, psychology, biotechnology), should be developed.

Part 4

Accreditation Conclusions

The staff responsible for the pharmacy programmes (master and doctoral) and their associated domain, impressed the Team with their competence , dedication and enthusiasm. The Faculty of Medicine and the Department of Pharmacy have strong and experienced leadership , which is supported by some very capable and enthusiastic young members of staff. The Team was also impressed by the enthusiasm of the students and the excellent relationship they had with the teaching staff.

In the evaluation process, the Team did not place any of the assessment criteria in the "not met" category, but there were criteria which were placed in the "concern" category. The recommendations of the Team given below relate to these concerns.

- 1. Overall programme goals for pharmacy masters and doctoral programmes should be made clear and explicit, and should be communicated to staff and students. These goals should be subject to expert review according to the needs of pharmacy in Estonia.
- 2. The quality assurance of the pharmacy programmes would benefit from a more structured and systematic approach which considers not only student feedback but also trends in grades and academic achievement. Systems are required to feedback this information to teaching staff.
- 3. The system for student counselling should be revised in accordance with student needs.
- 4. The dependence on didactic lectures as the main method of learning should be reduced and greater emphasis placed on group work and problem-based learning.
- 5. Modernisation of the masters programme should continue, particularly in the areas of pharmacognosy and pharmaceutical chemistry. New subjects such as clinical pharmacy, biotechnology and psychology should be developed.
- 6. The shortage of suitably qualified candidates to fill academic staff positions, particularly at senior level, requires urgent attention. Factors responsible for this may be related to the national situation, but young academics need to be encouraged with personal development plans and a progressive career structure. Also young pharmacy graduates must be encouraged into doctorate programmes to provide academics for the future.
- 7. Research in the Department of Pharmacy needs to be expanded and encouraged as a matter of urgency.
- 8. Facilities and equipment in the Department of Pharmacy are inadequate and outdated (in contrast to the excellent facilities at the Biomedicum building). This situation should be addressed urgently, with the prefered option being the relocation of the Department of Pharmacy to the Biomedicum site.
- 9. Sufficient resources must be provided for additional library material, particularly text books in the English language and scientific journals. Also , more places for "quiet study" for the students are required.

Part 5

Recommendations

Accreditation recommendation for the Masters Programme in Pharmacy (6505202) The Expert Team recommends **full accreditation.**

Accreditation recommendation for the Doctoral Programme in Pharmacy (8505202) The Expert Team recommends **full accreditation.**