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CHAPTER 1
INTRODUCTION

The aim of the University of Debrecen is to become a university of medical sciences committed to the prevention and restoration of health of the people, not only in its region but in the entire country.

In the past two decades both medical science and health care have entered a new era: the medical science of the 21st century. Molecular medicine is opening up and new possibilities are available for the diagnosis, prevention, prediction and treatment of the diseases. One can witness such a progress in medical sciences that has never been seen before. Modern attitudes in health care should be enforced in practice, including therapeutical approaches that consider the explanation and possible prevention of diseases, and attempt to comprehend and take the human personality into consideration. These approaches demand the application of the most modern techniques in all fields of the medical education.

All curricula wish to meet the challenges of modern times and they embody some very basic values. They are comprehensive; they take into consideration the whole human personality (body and soul) in its natural and social surroundings; and they are based upon the best European humanistic traditions. Moreover, all curricula prepare students for co-operation and teamwork.

With respect to education, both students and teachers are inspired to acquire higher levels of professionalism, precision, and problem solving skills, upon which the foundations of specialist training and independent medical practice can be built. This approach enables the assimilation of new scientific developments, facilitating further education and the continuous expansion of knowledge. The interplay of these factors ensures the ability to understand and handle the changing demands of health care.

With respect to research, the faculty members continuously acquire, internalize and subsume new knowledge, especially concerning the genesis, possible prevention and treatment of diseases. Moreover, new information aimed at improving, preserving and restoring the health of the society is also absorbed. The University of Debrecen is already internationally recognized in the fields of both basic and clinical research, and the clinicians and scientists of the University are determined to preserve this achievement. Special attention is given to facilitate and support the close co-operation of researchers representing basic science and clinical research, and/or interdisciplinary studies.

With respect to therapeutic practice, the main objective is to provide high quality, effective, up to date and much devoted health care to all members of the society, showing an example for other medical institutions in Hungary. One of the primary tasks is to continuously improve the actual standards of the diagnostic and therapeutic procedures and techniques, and to establish regional or even nationwide protocols.

With respect to serving the community, all faculty members wish to play a central role in shaping the policies of the health service; both within the region and in Hungary. They also want to ensure that sufficient number of medical doctors, dentists and other health care experts with university education is provided for the society.

With respect to the development, all employees strive for reinforcing those features and skills of the lecturers, scientists, medical doctors, health care professionals, collaborators and students which are of vital importance in meeting the challenges of medical education, research and therapy of the 21st century. These include humanity, empathy, social sensitivity, team-spirit, creativity, professionalism, independence, critical and innovative thinking, co-operation and management.

The organizational structure, including the multi-faculty construction of the institution, is a constantly improving, colorful educational environment, in which co-operation is manifest between the individual faculties and colleges, the various postgraduate programs as well as the molecular-
INTRODUCTION

and medical biology educations.

HIGHER EDUCATION IN DEBRECEN
A Brief History
1235: First reference to the town of Debrecen in ancient charters.
1538: Establishment of the “College of Reformed Church” in Debrecen.
1567: Higher education begins in the College.
1693: Declaration of Debrecen as a “free royal town”.
1849: Debrecen serves as the capital of Hungary for 4 months.
1912: Establishment of the State University of Debrecen comprising the Faculties of Arts, Law, Medicine and Theology.
1918: Inauguration of the Main Building of the Medical Faculty by King Charles IV of Hungary.
1921: The Medical Faculty becomes operational.
1932: Completion of buildings of the campus.
1944: Although during the Second World War, Debrecen became the capital of Hungary again (for 100 days), the University itself is abandoned for a while.
1949: The only year when the University has five faculties.
1950: The Faculty of Law idles; the Faculty of Science is established.
1951: The University is split up into three independent organizations: Academy of Theology, Medical School, Lajos Kossuth University of Arts and Sciences.
1991: The “Debrecen Universitas Association” is established.
1998: The “Federation of Debrecen Universities” is founded.
2000. The federation is transformed into the unified “University of Debrecen” with all the relevant faculties and with some 20,000 students.

Debrecen is the traditional economic and cultural center of Eastern Hungary. In the 16th century Debrecen became the center of the Reformed Church in Hungary and later it was referred to as the "Calvinist Rome". The 17th century was regarded as the golden age of the city because Debrecen became the mediator between the three parts of Hungary: the part under Turkish occupation, the Kingdom of Hungary and the Principality of Transylvania. For short periods of time, Debrecen served twice as the capital of Hungary. Nowadays, with its population of approximately a quarter of a million, it is the second largest city in Hungary.

Debrecen is a unique city: although it has no mountains and rivers, its natural environment is rather interesting. One of the main attractions and places of natural uniqueness in Hungary is Hortobágy National Park, known as “puszta” (“plain”), which begins just in the outskirts of Debrecen. This is the authentic Hungarian Plain without any notable elevations, with unique flora and fauna, natural phenomena (e.g. the Fata Morgana), and ancient animal husbandry traditions. The region is unmatched in Europe, no matter whether one considers its natural endowments or its historic and ethnographic traditions. A very lovely part of Debrecen is the “Nagyerdő” (“The Great Forest”), which is a popular holiday resort. Besides a number of cultural and tourist establishments, luxurious thermal baths and spas, Nagyerdő accommodates the University campus too.

The history of higher education in Debrecen goes back to the 16th century when the College of the Reformed Church was established. The University Medical School of Debrecen has its roots in this spiritual heritage. It was in the year of the millennium of the establishment of Hungary (1896) when the foundation of the present University was decided. The University of Debrecen was established in 1912, initially having four faculties (Faculties of Arts, Law, Medicine and Theology). The University was officially inaugurated by King Charles IV of Hungary on October 23rd, 1918. The educational activity at the University started in 1924, although the construction of the whole University was completed only in 1932. In 1951 the Faculty of Medicine became a self-contained,
independent Medical University for training medical doctors. The special training of dentists began in 1976. As a further development the University Medical School established the Health College of Nyíregyháza in 1991. In 1993, as part of a nationwide program, the University was given the rights to issue scientific qualifications and new Ph.D. programs were also launched. Several new programs (e.g. the training of molecular biologists, pharmacists, general practitioners) were commenced in the '90s. The Faculty of Public Health was established in 1999, while the Faculty of Dentistry was founded in 2000. The Faculty of Medicine celebrated the 90th anniversary of its foundation in October 2008 with a highly successful international scientific conference.

Education at the University of Debrecen

Debrecen, the second largest city of Hungary, is situated in Eastern Hungary. Students enrolled in the various programs (e.g. Medicine, Dentistry, Pharmacy, Public Health, Molecular Biology, etc.) study on a beautiful campus situated in the area called “Great Forest”.

The Hungarian Government gives major priorities to the higher education of health sciences in its higher education policy. One of these priorities is to increase the ratio of college level training forms within the Hungarian higher education system. The governmental policy wishes to implement conditions in which the whole health science education system is built vertically from the lowest (post-secondary or certificate) to the highest (PhD-training) levels. In fact, this governmental policy was the reason behind the establishment of the new Health Science Education Center within the Federation of Debrecen Universities (DESZ), based partially on the intellectual resources of the University of Debrecen. The new programs – with specialized training for paramedics – will help to correct the balance of the Hungarian labor-market that became rather unsettled in the past few decades.

The Act of Higher Education (1993) has restored the rights of the medical universities to award postgraduate degrees and residency, and permission was also given to license Physicians’ procedures. This kind of training required a new structure, a new administrative apparatus, and a suitable training center. The new residency programs were commenced in 1999.

The introduction of the credit system, starting in September 2003, has been mandatory in every Hungarian university, helping the quantitative and qualitative evaluation of the students’ achievements. Admission requirements for Hungarian students are defined at national level, and they are applicable for every student wishing to be enrolled into the Medicine or Dentistry programs.

International students must pass an entrance exam in biology and (depending on their preference) in physics or chemistry. In some special cases it may be possible for the candidates to apply for transfer to higher years on the basis of their previous studies and achievements. International students study in English language. Entrance for certain courses of the Health College is also possible on the basis of a special evaluation (scoring) and an entrance interview.

The syllabuses and classes of all courses correspond to European standards. The total number of contact hours in medical education is over 5,500, which can be divided into three main parts: basic theoretical training (1st and 2nd year), pre-clinical subjects (3rd year) and clinical subjects (4th and 5th year) followed by the internship (6th year). The proportion of the theoretical and practical classes is 30% to 70%; whereas the students/instructors ratio is about 8/1. The first two years of dentistry education are similar to the medicine program, but the former contains a basic dental training that is followed by a three-year-long pre-clinical and clinical training. Besides the medicine and dentistry programs, there are several other courses also available, including molecular biology. The various Health College courses include more and more new curricula.

The Medicine program delivered in English and intended for international students was commenced in 1987; whereas the Dentistry and Pharmacy programs for international students started in 2000.
INTRODUCTION

and 2004, respectively. The curriculum of the English language Medicine program meets all the requirements prescribed by the European medical curriculum, which was outlined in 1993 by the Association of Medical Schools in Europe. Compared to the Hungarian program, the most important differences are:

- Hungarian language is taught,
- More emphasis is laid upon the tropical infectious diseases (as parts of the “Internal Medicine” and “Hygiene and Epidemiology” courses).

Otherwise, the English language curriculum is identical with the Hungarian one. The 6th year of the curriculum is the internship that includes Internal Medicine, Pediatrics, Surgery, Obstetrics and Gynecology, Neurology, and Psychiatry. The completion of these subjects takes at least 47 weeks, although students are allowed to finish them within a 24-month-long period. The successfully completed internship is followed by the Hungarian National Board Examination. Just like the rest of the courses, the internship is also identical in the Hungarian and English programs.

A one-year-long premedical (Basic Medicine) course, which serves as a foundation year, is recommended for those applicants who do not possess sufficient knowledge in Biology, Physics and Chemistry after finishing high school.

After graduation, several interesting topics are offered for PhD training, which lasts for three years. If interested, outstanding graduates of the English General Medicine and Dentistry programs may join these PhD courses (“English PhD-program”). Special education for general practitioners has been recently started and a new system is in preparation now for the training of licensed physicians in Debrecen.

The accredited PhD programs include the following topics:

- Molecular and Cell Biology; Mechanisms of Signal Transduction
- Microbiology and Pharmacology
- Biophysics
- Physiology-Neurobiology
- Experimental and Clinical Investigations in Hematology and Hemostasis
- Epidemiological and Clinical Epidemiological Studies
- Cellular- and Molecular Biology: Study of the Activity of Cells and Tissues under Healthy and Pathological Conditions
- Immunology
- Experimental and Clinical Oncology
- Public Health
- Preventive Medicine
- Dental Research

The PhD-programs are led by more than 100 accredited, highly qualified coordinators and tutors.

Medical Activity at the Faculty of Medicine

The Faculty of Medicine is not only the second largest medical school in Hungary, but it is also one of the largest Hungarian hospitals, consisting of 35 departments; including 21 different clinical departments with more than 1,800 beds. It is not only the best-equipped institution in the area but it also represents the most important health care facility for the day-to-day medical care in its region.

The Kenézy Gyula County Hospital (with some 1,400 beds) is strongly affiliated with the University of Debrecen and plays an important role in teaching the practical aspects of medicine. There are also close contacts between the University and other health care institutions, mainly (but not exclusively) in its closer region. The University of Debrecen has a Teaching Hospital Network consisting of 26 hospitals in Israel, Japan and South Korea.
It is also of importance that the University of Debrecen has a particularly fruitful collaboration with the Nuclear Research Institute of the Hungarian Academy of Sciences in Debrecen, allowing the coordination of all activities that involve the use of their cyclotron in conjunction with various diagnostic and therapeutic procedures (e.g. Positron Emission Tomography 'PET').

Scientific Research at the Faculty of Medicine
Scientific research is performed both at the departments for basic sciences and at the laboratories of clinical departments. The faculty members publish about 600 scientific papers every year in international scientific journals. According to the scientometric data, the Faculty is among the 4 best of the more than 80 Hungarian research institutions and universities. Lots of scientists reach international recognition, exploiting the possibilities provided by local, national and international collaborations. Internationally acknowledged research areas are Biophysics, Biochemistry, Cell Biology, Immunology, Experimental and Clinical Oncology, Hematology, Neurobiology, Molecular Biology, Neurology, and Physiology. The scientific exchange program involves numerous foreign universities and a large proportion of the faculty members are actively involved in programs that absorb foreign connections (the most important international collaborators are from Belgium, France, Germany, Italy, Japan, the UK and the USA).
CHAPTER 2

PHARMACIST-TRAINING AT THE UNIVERSITY OF DEBRECEN

Pharmacist-training at the University of Debrecen

The establishment of the Faculty of Pharmacy at the University of Debrecen serves continuous development, change, renewal, and also reputation and prestige both nationally and internationally. At the University of Debrecen the organization and formation of pharmacist-training was started by Professor Géza Mezey in 1995, as a result of which in 1996 the teaching of the first year was launched in the field of pharmacist-training at the those days separately functioning Lajos Kossuth University of Sciences and Debrecen University of Medical Sciences. For the establishment and building of the Institute of Pharmaceutical Sciences (2001) the outstanding cooperation, effort, compromise approach, and continuous support of the management of the former Debrecen University of Medical Sciences and Lajos Kossuth University of Sciences were inevitable. Without these and the active assistance and collaboration of the colleagues and the university’s management, the Faculty of Pharmacy could not have been in its current form and developed for the 100th year jubilee anniversary of establishment of the University of Debrecen. The coordination and improvement of the pharmacist-training was further concentrated into the hands of Professor Géza Mezey, the director of the Institute of Pharmaceutical Sciences (2001), until his death (17 October, 2001).

The main building of the present Faculty of Pharmacy, where the Center’s Pharmacy and the Dean’s Office had been placed, was handed over in 2001 and the new building fully satisfies in every way the widespread supply of medicinal products towards the departments of the University of Debrecen and meets the requirements of pharmacist-training according to the standards of the European Union. Without the previous and present management of the University, the devoted help and cooperation of the departments belonging to the Faculty of General Medicine and the former Faculty of Natural Sciences at Lajos Kossuth University of Sciences where the acquisition of the basic subjects of Chemistry and Biology is ensured for the students of Pharmacy, the pharmacist-training would not have become possible at the University of Debrecen. The Hungarian anthem was first played in 2001 as this was the first year when pharmacist degrees were awarded at the ceremonial council meeting of the University of Debrecen. With the support and guidance of the management of that time and of he president of the Medical and Health Science Center, the draft for the accreditation of the Institute of Pharmaceutical Sciences to become a faculty was prepared. In 2003 it was approved by the Hungarian Accreditation Committee and from this year on the Faculty of Pharmacy started to operate as a separate organizational unit at the University of Debrecen, as its eleventh faculty. One of the fundamental prerequisites for the Institute of Pharmaceutical Sciences to become a faculty was to establish at least five independent departments. The University fulfilled this basic requirement by the founding of the Department of Pharmaceutical Technology (1996), Pharmacology (1998), Pharmaceutical Management and Organization (1999), Biopharmacy (2000), Pharmaceutical Chemistry (2001), Clinical Pharmacology (2001), and thus increased the number of its departments to six. In 2011 the number of departments at the Faculty of Pharmacy increased again as TEVA and the University of Debrecen Medical and Health Science Center’s Faculty of Pharmacy founded the “of Industrial Pharmaceutics” that strengthens the practical education for the students during the training of pharmacist doctors.

The Faculty of Pharmacy successfully joined the University’s Ph.D. training within the framework of the scheduled programs of the doctorate schools. After successfully turning into faculty, we prepared the thematics of the English language pharmacist-training, and successfully launched the English language training (2004) for the foreign students of Pharmacy – which has already had considerable traditions at the fields of medical doctor
CHAPTER 2

and dentist training at the University of Debrecen. There are more and more foreign students applying for the English language program, at present the number per year exceeds 25 persons. Being grateful for the efforts of Professor Géza Mezey, the Faculty commemorates him with honor through the Dr. Géza Mezey Foundation named after him. The Advisory Board of the Géza Mezey Foundation and the Dean of the University of Debrecen’s Faculty of Pharmacy have been awarding commemorative medals each year since 2003 for outstanding scholastic records, outstanding contributions to the student scientific society, and also as the acknowledgement of effective education.
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### INTERNATIONAL STUDENT UNION DEBRECEN

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<td><strong>Address</strong></td>
<td>4032 Debrecen, Egyetem tér 1.</td>
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CHAPTER 4

ADMINISTRATIVE UNITS

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Ms. Éva Ludánszki
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Ms. Réka Rónai M.Sc.

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Ms. Judit Derzsi M.A.
Ms. Nóra Farágó M.Sc.
Ms. Anikó Karcza B.Sc.
Ms. Ágnes Ojtozi M.A.
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Agent&Marketing Coordinator
Tamás Zabán M.Sc.

Marketing Coordinator
Ms. Eszter Balázs M.Sc.
Ms. Dóra Mónus M.A.

Financial Coordinator
Ms. Rita Kovács J.D.

Agent Coordinator
József Harmati J.D.
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<tr>
<th>Administrative Unit</th>
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<tr>
<td>Ranking and Marketing Coordinator</td>
<td>Ms. Zsófia Münnich M.Sc.</td>
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<tr>
<td>English Program Coordinators</td>
<td>Ms. Dóra Benkő</td>
<td>(Admission, Visa Issues, BMC, US Loans)</td>
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<tr>
<td></td>
<td>Ms. Regina Berei</td>
<td>(Tuition fee, Financial certificates, Refunds)</td>
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<td>Ms. Marianna Gyuris</td>
<td>(Admission, Visa issues, USMLE, MCCEE, Stipendium Hungaricum Scholarship, Wyckoff Heights)</td>
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<td></td>
<td>Ms. Ildikó Lakatos M.A.</td>
<td>(Admission, Visa Issues)</td>
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<td>Ms. Krisztina Németh M.Sc.</td>
<td>(Bulletin)</td>
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<td>Ms. Enikő Sallai M.Sc.</td>
<td>(Tuition fee, Health Insurance)</td>
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<td>Ms. Mária Tóth M.Sc.</td>
<td>(Stipendium Hungaricum Scholarship)</td>
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<td>IT Project Coordinator</td>
<td>Imre Szűcs B.Sc.</td>
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<td>Ms. Beáta Lontay M.Sc., Ph.D.</td>
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<td>Course Coordinator</td>
<td>Ms. Klára Matesz M.D., Ph.D., D.Sc.</td>
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<td>Study Advisor</td>
<td>András Penyige M.Sc., Ph.D. (BMC I 1st semester; BMC II)</td>
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<td>Norbert Szentandrássy M.D., Ph.D. (BMC I 2nd semester; BMC II)</td>
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<td>Lecturer</td>
<td>János Almássy M.Sc., Ph.D.</td>
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<td>Ms. Zsófia Antal M.D., Ph.D.</td>
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<td>András Birinyi M.Sc., Ph.D.</td>
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<td>Ms. Zsuzsanna Birkó M.Sc., Ph.D.</td>
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<td>Sándor Biró M.Sc., Ph.D., D.Sc.</td>
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<td>Gergely Buglyó M.D., Ph.D.</td>
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<td>János Fodor M.Sc., Ph.D.</td>
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<td>Balázs Horváth M.D., Ph.D.</td>
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<td>András Mádi M.Sc., Ph.D.</td>
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<td>Ms. Johanna Mihály M.Sc., Ph.D.</td>
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<td>Ms. Melinda Paholcsék M.Sc., Ph.D.</td>
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<td>Balázs Pál M.D.,Ph.D.</td>
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<td>Ms. Éva Rácz M.Sc., Ph.D.</td>
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<td>Ms. Anitta Kinga Sárvári M.Sc.</td>
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Vice Dean for Education Affairs
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Gyula Buchholcz D.Pharm., Ph.D.

Invited Lecturer
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Tibor Bárd D.Pharm.
Dávid Bárd D.Pharm.
László Elek J.D.
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                        Zsolt Szűcs Ph.D.  
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            Dániel Nemes D.Pharm.
            Ms. Ágota Pető D.Pharm.
            Ms. Ágnes Rusznyák D.Pharm.
Head of Office  Ms. Mária Vaszily
<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
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<tbody>
<tr>
<td>Professor, Head of Department</td>
<td>Árpád Tósaki D.Pharm., Ph.D., D.Sc.</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>István Bak M.Sc., Ph.D. habil.</td>
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<tr>
<td>Assistant Professor</td>
<td>István Lekli D.Pharm., Ph.D.</td>
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<td>Assistant Lecturer</td>
<td>Ms. Evelin Csépányi D.Pharm., Ph.D.</td>
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<td>Ms. Alexandra Gyöngyösi Ph.D.</td>
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<tr>
<td>PhD Student</td>
<td>Ms. Kitti Szőke D.Pharm.</td>
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<td>Academic Advisor</td>
<td>István Lekli D.Pharm., Ph.D.</td>
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ASSOCIATE PROFESSOR, HEAD OF THE DEPARTMENT

Péter Szűcs M.D., Ph.D.

FULL PROFESSOR, HEAD OF ORAL ANATOMY DIVISION

Ms. Klára Matesz M.D., Ph.D., D.Sc.

FULL PROFESSOR

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PROFESSOR EMERITUS

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Ms. Ildikó Papp M.Sc., Ph.D.

Ms. Ildikó Wéber M.Sc., Ph.D.

PHD STUDENT

Ms. Andrea Gajtkó M.Sc.

Tibor Hajdú M.D.

Ms. Andrea Hunyadi M.Sc.

Ms. Fariba Javdani M.D.

Miklós Sivadó D.Pharm.

Mohit Srivastava M.Sc.

Ms. Rita Varga M.Sc.
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<tr>
<td>Senior Scientific Officer</td>
<td>Ms. Petra Talapka Ph.D.</td>
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<td>Ms. Angelika Varga M.Sc., Ph.D.</td>
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<td>Postgraduate Lecturer</td>
<td>Ms. Cintia Angel M.Sc.</td>
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<td>Ms. Csilla Somogyi M.Sc.</td>
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<td>Ms. Mónika Szakadát M.Sc.</td>
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<td>Postgraduate Lecturer</td>
<td>Ms. Petra Talapka Ph.D.</td>
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<td>Ms. Angelika Varga M.Sc., Ph.D.</td>
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<td>Postgraduate Lecturer</td>
<td>Ms. Cintia Angel M.Sc.</td>
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<td>Invited Lecturer</td>
<td>Tamás Papp M.D., Ph.D.</td>
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<tr>
<td>Academic Advisor for 1st year medical and dental students</td>
<td>Ms. Ildikó Wéber M.Sc., Ph.D.</td>
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<tr>
<td>Academic Advisor for 1st year pharmacy students</td>
<td>Ms. Ildikó Papp M.Sc., Ph.D.</td>
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<tr>
<td>Academic Advisor for 2nd year medical and dental students</td>
<td>Ms. Ildikó Wéber M.Sc., Ph.D.</td>
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**CHAPTER 7**

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# CHAPTER 8

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Fellow  
Ms. Krisztina Jámbor M.Sc.  
Ms. Viktória Koroknai M.Sc.  
Werissa Abebe Nardos M.Sc.
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István Szász M.Sc.
Szabolcs Varga Ph.D.
Ms. Valéria Vinczéné Sipos M.Sc.

Academic Advisor
Ms. Szilvia Fiatal M.D., Ph.D.
Sándor Szűcs M.Sc., Ph.D.

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Ágoston Nagy Ph.D.
Ms. Katalin Varga M.Sc.

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Ms. Gyöngyi Karácsony M.Sc.

Reference Services
Ms. Edit Görögh M.Sc., Ph.D.

Collection Development Department
Ms. Katalin Takácsné Bubnó M.Sc.

Education and Research Support Department
Ms. Judit Éva Fazekas-Paragh M.Sc.
CHAPTER 11

UNIVERSITY CALENDAR FOR PHARMACY PROGRAM 2019/2020 ACADEMIC YEAR

CRASH COURSE HUNGARIAN LANGUAGE: August 26 – September 6, 2019

OPENING CEREMONY: September 8, 2019

1st SEMESTER

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Examination Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd year Pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd year Pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th year Pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th year Pharmacy</td>
<td>July 22- September 20, 2019</td>
<td>December 16, 2019 – January 24, 2020</td>
</tr>
<tr>
<td></td>
<td>(2 months state exam practice)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>September 23 – December 13, 2019</td>
<td></td>
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</tbody>
</table>

2nd SEMESTER

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Examination Period</th>
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</thead>
<tbody>
<tr>
<td>Basic Medicine Course II</td>
<td>February 10 – May 15, 2020</td>
<td>May 18 -June 12, 2020</td>
</tr>
<tr>
<td></td>
<td>(14 weeks)</td>
<td>(4 weeks)</td>
</tr>
<tr>
<td>1st year Pharmacy</td>
<td>January 6 – June 12, 2020</td>
<td>June 15 – July 3, 2020</td>
</tr>
<tr>
<td></td>
<td>(23 weeks)</td>
<td>(3 weeks)</td>
</tr>
<tr>
<td>2nd year Pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd year Pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th year Pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th year Pharmacy</td>
<td>January 27 – May 29, 2020</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4 months state exam practice)</td>
<td></td>
</tr>
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</table>

SUMMER PRACTICE

<table>
<thead>
<tr>
<th>Year</th>
<th>Date in 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd and 3rd year Pharmacy</td>
<td>July 6 – July 31, 2020 or August 3 – August 28, 2020</td>
</tr>
<tr>
<td>practice</td>
<td>(4 weeks)</td>
</tr>
</tbody>
</table>
ACADEMIC PROGRAM FOR THE BASIC MEDICINE COURSE

CHAPTER 12

ACADEMIC PROGRAM FOR THE BASIC MEDICINE COURSE

Basic Medicine Course (BMC, Premedical Studies)

Duration of studies: 1 year (2 semesters)

The one-year premedical Basic Medicine Course is recommended to those students who do not have sufficient knowledge in Biology, Physics and Chemistry from high school. The requirements in these premedical science subjects are rigorous, thus it is recommended that students who need a period of preparation prior to beginning the General Medicine, Dentistry or Pharmacy Program join the Basic Medicine Course. Students successfully completing the course are directly admitted to their chosen program. In addition to the Basic Medicine Course starting each September, our University launches an Intensive BMC in January as well.

Class Behavior

Students must not use cell phones to talk or text during class. Cell phones must be switched off or kept in silence mode during class. In seminars, students will be expected to participate in seminar discussions. Students are encouraged to ask questions related to the topic of the lectures discussed, and participate in solving problems related to the topic of the seminar. Some professors will ask for students to volunteer information, but some professors call on students randomly. It is, thus, a good idea to come to class prepared so as not to be embarrassed in front of the class. Students should not disrupt the class by talking to each other. If one continues to disrupt the class, the student may be asked to leave. The usage of electronic devices, textbooks and any form of interaction between students during the tests is strictly forbidden. Electronic devices (cell phones, tablets, dictionaries, etc.), except for approved simple calculators, must not be within the reach (in pocket, in the desk, etc.) of students during tests. It is the students' responsibility to stow these items before the test begins without specific warning by the supervising teachers. Violation of these above mentioned regulations results in an immediate and unconditional dismissal from the program.

Requirements

The 2-semester course consists of lectures and seminars. Attending lectures is strongly recommended, attendance of seminars is compulsory and recorded. Everyone must attend the seminars with the group designated by the Registrar's Office.

Absence can significantly affect your understanding and can have serious implications of progression in your studies. One might have a maximum of three seminar absences per semester to have the opportunity to get exemption. Students missing 4 seminars per semester cannot be exempted from the End of Semester Examination (ESE) or Final Examination (FE), regardless of their score reached on the Self Control Tests. Students missing 5 or more seminars per semester are dismissed from the course. Missed seminars cannot be made up, unless one obtains prior permission to be absent.

The knowledge of students will be tested 4 times during each semester using a written test system by Self Control Tests (SCT). The first semester is ended with an End of Semester Examination (ESE) covering the topics of all lectures and seminars of the first semester. Three dates will be set for the ESE during the winter examination period. Unsuccessful students may repeat the ESE twice (B and C chances). Students repeating the course must successfully pass the
first semester either with exemption or at least with a score of 45% of ESE, otherwise their studies will be terminated. The ESE is not compulsory for non-repeater students and even who fail may continue their study in the second semester, however, they lose their chance to receive bonus points. Exam exemptions and bonus point policy are to improve the students’ performance on SCTs and give them a chance to get exemption of the FE (described below) even with SCT scores lower than 30% in the first semester. Exact details of the exemption of ESE:
- one’s average score of the three best first semester SCTs is at least 45%, AND
- (s)he successfully completed all the SCTs at least with 30% score, AND
- (s)he has a maximum of 3 seminar absences for each subject in the first semester.

The course ends with a **Final Exam (FE)** covering the whole material of the first and second semesters. A minimum of four FE dates will be set during the summer examination period. Unsuccessful students may repeat the FE twice (B and C chances, and the latter ends up with an oral examination part). Exemption from FE is offered for students who achieve excellent academic performance during their studies on the following base:
- the average score of the six best SCTs (out of 8) of the two semesters is at least 45%, AND
- passed all the SCTs with at least 30%, AND
- (s)he has a maximum of 3 seminar absences for a given subject per semester.

**OR**
- the average of the ESE score taken 3 times plus the scores of the 3 best SCTs in the 2nd semester is at least 45%, AND
- passed all the SCTs with at least 30%, AND
- (s)he has a maximum of 3 seminar absences for each subject per semester.

Bonus points will be added to the FE score (in %) of eligible students and calculated as follows:

<table>
<thead>
<tr>
<th>The average of the ESE score three times and the best 3 2nd semester SCTs</th>
<th>Bonus points</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR the average of the best 6 SCTs</td>
<td></td>
</tr>
<tr>
<td>40.00-40.99</td>
<td>1</td>
</tr>
<tr>
<td>41.00-41.99</td>
<td>2</td>
</tr>
<tr>
<td>42.00-42.99</td>
<td>3</td>
</tr>
<tr>
<td>43.00-43.99</td>
<td>4</td>
</tr>
<tr>
<td>44.00-44.99</td>
<td>5</td>
</tr>
</tbody>
</table>

Students who could not meet the above described conditions for exemption during the two semesters must sit for the FE from the whole material of the first and second semesters. The participation shall be preceded by ID confirmation (i.e. student’s card, passport or driving license) before all forms of tests.

Self Control Tests, End of Semester Exams, and Final Exams will be assessed as follows.

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 44.99:</td>
<td>fail (1)</td>
</tr>
<tr>
<td>45.00 - 64.99:</td>
<td>pass (2)</td>
</tr>
<tr>
<td>65.00 - 74.99:</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>75.00 - 84.99:</td>
<td>good (4)</td>
</tr>
<tr>
<td>85.00 - 100:</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

Absence for any reason counts as 0%.

Course coordinator: Dr. Beáta Lontay, Department of Medical Chemistry
ACADEMIC PROGRAM FOR THE BASIC MEDICINE COURSE

Subject: **INTRODUCTION TO BIOLOGY I.**
Year, Semester: Basic Medicine Course, 1st
Number of teaching hours:
Lecture: 56
Seminar: 28

1st week:
**Lecture:**
The chemistry of life 1
Proteins, carbohydrates and lipids 1.
Proteins, carbohydrates and lipids 2.
Proteins, carbohydrates and lipids 3.

2nd week:
**Lecture:**
Proteins, carbohydrates and lipids 4.
Nucleic acids
Cells: the working units of life 1. Prokaryotes*
Cells: the working units of life 2.

3rd week:
**Lecture:**
Cells: the working units of life 3.
Cells: the working units of life 4.
Cells: the working units of life 5.
Cell membranes 1.

4th week:
**Lecture:**
Cell membranes 2.
Cell membranes 3.
Cell membranes 4.
Energy, enzymes and metabolism 1.

5th week:
**Lecture:**
Energy, enzymes and metabolism 2.
Energy, enzymes and metabolism 3.
Pathways that harvest chemical energy 1.

6th week:
**Lecture:**
Pathways that harvest chemical energy 2
Pathways that harvest chemical energy 3.
Pathways that harvest chemical energy 4.
Pathways that harvest chemical energy 5.

7th week:

8th week:
**Lecture:**
Cell cycle and cell division 2.
Cell cycle and cell division 2.
Inheritance, genes and chromosomes 1.
Inheritance, genes and chromosomes 2.

9th week:
**Lecture:**
Inheritance, genes and chromosomes 3.
Inheritance, genes and chromosomes 4.
Inheritance, genes and chromosomes 5.
Inheritance, genes and chromosomes 6.

10th week:
**Lecture:**
Inheritance, genes and chromosomes / Pop. Gen
DNA and its role in heredity 1.
DNA and its role in heredity 2.
DNA and its role in heredity 3.

11th week:
**Lecture:**
From DNA to protein: gene expression 1.
From DNA to protein: gene expression 2.
From DNA to protein: gene expression 3.
From DNA to protein: gene expression 4.

12th week:
**Lecture:**
From DNA to protein: gene expression 4.
From DNA to protein: gene expression 5.
Gene mutation and molecular medicine 1.
Gene mutation and molecular medicine 2.

13th week:
CHAPTER 12

Lecture:
Gene mutation and molecular medicine 3.
Gene mutation and molecular medicine 4.
Regulation of gene expression 1. (Prokaryotic reg.)
Regulation of gene expression 2. (Eukaryotic reg.)

14th week:
Lecture:
Regulation of gene expression 3. (Eukaryotic reg.)
Regulation of gene expression 4. (Eukaryotic reg.)
The mechanism of evolution 1.
The mechanism of evolution 2.

Contact person: Dr. András Penyige, Associate Professor, Department of Human Genetics

Subject: INTRODUCTION TO BIOLOGY II.
Year, Semester: Basic Medicine Course, 2nd
Number of teaching hours:
Lecture: 42
Seminar: 28

1st week:
Lecture:
Tissues, Organs and Organ Systems 1.
Tissues, Organs and Organ Systems 2.
Tissues, Organs and Organ Systems 3.

2nd week:
Lecture:
Homeostasis and cellular physiology.
Temperature Regulation.
Blood, a fluid tissue 1.

3rd week:
Lecture:
Blood, a fluid tissue 2.
Circulation 1.
Circulation 2.

4th week:
Lecture:
Circulation 3.
Circulation 4. The lymphatic system.
Natural Defenses against Disease 1.

5th week:
Lecture:
Natural Defenses against Disease 2.
Natural Defenses against Disease 3.
Nutrition, Digestion and Absorption 1.

6th week:
Lecture:
Nutrition, Digestion and Absorption 2.
Nutrition, Digestion and Absorption 3.
Nutrition, Digestion and Absorption 4.

7th week:
Lecture:
Respiratory system 1.
Respiratory system 2.
Salt and Water Balance and Nitrogen Excretion 1.

8th week:
Lecture:
Salt and Water Balance and Nitrogen Excretion 2.
Hormones 1.
Hormones 2.

9th week:
Lecture:
Hormones 3.
Hormones 4.
Hormones 5.

10th week:
Lecture:
Neurons and Nervous system 1.
Neurons and Nervous system 2.
Neurons and Nervous system 3.

11th week:
Lecture:
Neurons and Nervous system 4.
Neurons and Nervous system 5.
Sensory systems 1.

12th week:
Lecture:
Sensory systems 2.
Musculoskeletal Systems 1.

13th week:
Lecture:
Musculoskeletal Systems 2.
Musculoskeletal Systems 3.
Reproduction and Development 1.
Reproduction and Development 2.

14th week:
Lecture:
Reproduction and Development 3.

Contact person: Dr. Norbert Szentandrássy, Department of Physiology

Subject: INTRODUCTION TO PHYSICS I.
Year, Semester: Basic Medicine Course, 1st
Number of teaching hours:
Lecture: 56
Seminar: 28

1st week:
Lecture:
Radians, vectors and scalars, geometry, equation solving, problem solving, graphing. Functions, calculator usage

2nd week:
Lecture:
Motion in one dimension, displacement, velocity, acceleration, motion diagrams.
Freely falling objects.

3rd week:
Lecture:
Vectors and their properties. Components of vectors. Displacement, velocity and acceleration in two dimensions.
Motion in two dimensions. Projectile motion.

4th week:
Lecture:
The laws of motion. Newton’s First, Second and Third Law.
Applications of Newton’s Laws. Forces of friction.

5th week:
Lecture:

6th week:
Lecture:
Angular speed and angular acceleration. Rotational motion under constant angular acceleration.

7th week:
Lecture:
Centripetal acceleration. Newtonian gravitation.
Chapter 12

Kepler’s laws.
Torque and the two conditions for equilibrium.
The center of gravity.

8th week:
Lecture:
Rotational kinetic energy. Angular momentum.

9th week:
Lecture:
Buoyant forces and Archimedes’s principle.
Fluids in motion.
HP equation, Circulation, blood pressure measurement, transport phenomena, diffusion, osmosis, calculations with cont. eq + HP eq.

10th week:
Lecture:
Temperature and the zeroth law of thermodynamics. Thermometers and temperature scales.

11th week:
Lecture:
The first law of thermodynamics. The second law of thermodynamics. Entropy. Refrigerators and heat pumps.

12th week:
Lecture:

13th week:
Lecture:
Sound. Energy and intensity of sound waves.
Doppler effect
Ultrasound. Shock waves, standing waves. The ear and the principles of hearing.

14th week:
Lecture:
Interactive seminar and preparation for the ESE.

Contact person: Dr. Zoltán Varga, Associate Professor, Department of Biophysics
Recommended book: Serway-Vuille: College Physics, Brooks/Cole

Subject: Introduction to Physics II.
Year, Semester: Basic Medicine Course, 2nd
Number of teaching hours:
Lecture: 56
Seminar: 28

1st week:
Lecture:

2nd week:
Lecture:

3rd week:
Lecture:
Electric current. Current and voltage measurements in circuits. Resistance and Ohm's law. Resistivity, temperature variation of

4th week:
Lecture:

5th week:
Lecture:

6th week:
Lecture:

7th week:
Lecture:

8th week:
Lecture:

9th week:
Lecture:

10th week:
Lecture:
Wave optics. Conditions for interference, polarization of light. Diffraction. The camera, the simple magnifier, the compound microscope, the telescope and the eye.

11th week:
Lecture:

12th week:
Lecture:

13th week:
Lecture:

14th week:
Lecture:
Preparation for the final exam.

Contact person: Dr. Zoltán Varga, Associate Professor, Department of Biophysics
Recommended book: Serway-Vuille: College Physics, Brooks/Cole

Subject: INTRODUCTION TO MEDICAL CHEMISTRY I.
Year, Semester: Basic Medicine Course, 1st
Number of teaching hours:
Lecture: 56
Seminar: 28
CHAPTER 12

1st week:
Lecture:
Introduction to Chemistry. Symbols of the elements. Physical and chemical properties
The SI system of measurement

2nd week:
Lecture:
The atomic theory. Structure of the atom, nuclear arithmetic
Mixtures and chemical compounds. Chemical formulas. Naming chemical compounds.

3rd week:
Lecture:
Atomic, molecular and molar mass relationships.
Percent composition and empirical/molecular formulas. Chemical equations, stoichiometry

4th week:
Lecture:
Summary of general chemistry 1
Test #1

5th week:
Lecture:
The electromagnetic spectrum. Atomic spectra.
The Bohr model of hydrogen atom. The quantum mechanical model of the atom.
Electron configurations and the periodic table. Classification of the elements

6th week:
Lecture:
Periodic properties
Chemical bonds: metallic, ionic, and covalent bond. Electron-dot structures

7th week:
Lecture:
VSEPR and valence bond theory
Intermolecular forces

8th week:
Lecture:
Summary of general chemistry 2
Test #2

9th week:
Lecture:
The gaseous state
Liquid and solid state, phase changes. The chemistry of water

10th week:
Lecture:
Solutions. Electrolytes and nonelectrolytes
Chemical equilibrium

11th week:
Lecture:
Summary of general chemistry 3
Test #3

12th week:
Lecture:
Acids and bases 1
Acids and bases 2

13th week:
Lecture:
Thermochemistry: internal energy and state functions. Enthalpy. Hess’s law
Redox reactions. Activity series of the elements. Galvanic cells

14th week:
Lecture:
Summary of general chemistry 4
Test #4

Subject: INTRODUCTION TO MEDICAL CHEMISTRY II.

Year, Semester: Basic Medicine Course, 2nd
Number of teaching hours:
Lecture: 56
Seminar: 28

88
<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Lecture: The main-group elements. s-, p-, d-block metals Nonmetals: hydrogen, halogens and noble gases</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>Lecture: Nonmetals: oxygen and sulfur Nonmetals: nitrogen, phosphorus and carbon</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>Lecture: Covalent bonding in organic compounds. Classification of organic compounds</td>
<td>Test #5</td>
</tr>
<tr>
<td>5th</td>
<td>Lecture: Unsaturated hydrocarbons Aromatic compound: structure and properties</td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>Lecture: Heteroaromatic compounds. Reactions of benzene and its derivatives Organic halogen compounds</td>
<td></td>
</tr>
<tr>
<td>7th</td>
<td>Lecture: Summary of organic chemistry 1 Test #6</td>
<td></td>
</tr>
<tr>
<td>8th</td>
<td>Lecture: Alcohols and phenols Ethers, thioethers.</td>
<td></td>
</tr>
<tr>
<td>9th</td>
<td>Lecture: Organic sulfur compounds Aldehydes, ketones and quinones</td>
<td></td>
</tr>
<tr>
<td>10th</td>
<td>Lecture: Nitrogen containing organic compounds: aliphatic amines Nitrogen containing organic compounds: heterocyclic nitrogen compounds. Amines of biological importance</td>
<td></td>
</tr>
<tr>
<td>11th</td>
<td>Lecture: Summary of organic chemistry 2 Test #7</td>
<td></td>
</tr>
<tr>
<td>12th</td>
<td>Lecture: Carboxylic acids Substituted carboxylic acids. Carboxylic acid derivatives: esters and amides</td>
<td></td>
</tr>
<tr>
<td>13th</td>
<td>Lecture: Carboxylic acid derivatives: halides and anhydrides; salts and detergents Stereochemistry</td>
<td></td>
</tr>
<tr>
<td>14th</td>
<td>Lecture: Summary of organic chemistry 3 Test #8</td>
<td></td>
</tr>
</tbody>
</table>

Contact person: Dr. Endre Kókai, Department of Medical Chemistry
Recommended books: McMurry, Fay: Chemistry (7th edition)
Erdődi, Csortos: Organic chemistry for premedical students (2010)
### CHAPTER 12

**Subject:** HUNGARIAN LANGUAGE FOR BMC STUDENTS  
**Year, Semester:** Basic Medicine Course 2nd  
**Number of teaching hours:**  
Practical: 36

|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|

### Self Control Test

### Requirements

**Attendance**  
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6 occasions, (no matter why) the final signature will be refused and the student must repeat the course. Absentees can make up the missed classes in the same week with their own teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the coursebook to the class for the second time the attendance is refused.

**Testing, evaluation**  
In each Hungarian language course, students must sit for 2 written language tests and an oral exam. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test. A further minimum requirement is the knowledge of 200 words per semester divided into 10 word quizzes. There are five word quizzes before and another five after the midterm test. If students fail or miss any word quizzes they cannot start their written test and have to take a vocabulary exam that includes all 100 words before the midterm and end term tests. A word quiz can be postponed by a week and students can take it only with their own teacher. Students can get bonus points (5-5%) by taking two extra quizzes containing 20 sentences each, before the midterm and end term tests. The sentences are taken from the units of the coursebook.
The oral exam consists of a role-play from a list of situations covered in the coursebook. If students fail the oral exam, they fail the whole course. The results of the written tests and the oral exam are combined and averaged.

Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 59</td>
<td>fail (1)</td>
</tr>
<tr>
<td>60-69</td>
<td>pass (2)</td>
</tr>
<tr>
<td>70-79</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>80-89</td>
<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score of the written tests is below 60, the student can take a written remedial exam once covering the whole semester’s material.

**Course book:** See the website of the Department of Foreign Languages: [ilekt.med.unideb.hu](http://ilekt.med.unideb.hu).
Oral exam topics and vocabulary minimum lists are also available on the website.

**Reading materials:**
Gerő Ildikó-Kovács Judit: Színesen magyarul (2017.)
CHAPTER 13

ACADEMIC PROGRAM FOR THE INTENSIVE BASIC MEDICINE COURSE

The six-month intensive premedical Basic Medicine Course is recommended to those students who do not have thorough knowledge in Biology, Physics and Chemistry from high school. The requirements of these condensed premedical science subjects are very rigorous, thus preparation prior to the beginning the General Medicine, Dentistry or Pharmacy Program is recommended. Students successfully completing the course are directly admitted to their chosen program. The Intensive Basic Medicine Course starts in January.

Class Behavior

Students should not use cell phones to talk or text during class. Cell phones must be switched off or kept in silence mode during class. In seminars, students will be expected to participate in seminar discussions. Students are encouraged to ask questions related to the topic of the lectures discussed, and participate in solving problems related to the topic of the seminar. Some professors will ask for students to volunteer information, but some professors call on students randomly. It is, thus, a good idea to come to class prepared so as not to be embarrassed in front of the class. Students should not disrupt the class by talking to each other. If one continues to disrupt the class, the student may be asked to leave. The usage of electronic devices, textbooks and any form of interaction between students during the tests is strictly forbidden. Electronic devices (cell phones, tablets, dictionaries, etc.), except for approved simple calculators, must not be within the reach (in pocket, in the desk, etc.) of students during tests. It is the students' responsibility to stow these items before the test begins without specific warning by the supervising teachers. Violation of these above mentioned regulations results in an immediate and unconditional dismissal from the program.

Requirements

The course consists of lectures and seminars. Attending lectures is strongly recommended, attendance of seminars is compulsory and recorded. Everyone must attend the seminars with the group designated by the Registrar’s Office.

Absence can significantly affect your understanding and can have serious implications for progression in your studies. One might have a maximum of six seminar absences to have the opportunity to get exemption. Students missing 7-8 seminars cannot be exempted from the Final Examination (FE), regardless of their score reached on the Self Control Tests. Students omitting 9 or more seminars are dismissed from the course. Missed seminars cannot be made up unless one obtains prior permission to be absent.

The knowledge of the students will be tested 6 times during the entire course using a written test system by Self Control Tests (SCT). The course ends with a Final Exam (FE) from the whole material of the course and a minimum of four FE dates will be set during the summer examination period. Unsuccessful students may repeat the FE twice (B and C chances, and the latter ends up with an oral examination part). Exam exemption and bonus point policy are used to improve the students’ performance on SCTs. Exact details of these policies will be described below.

Exemption from FE is offered for students who achieve excellent academic
performance during their studies under the following circumstances:
- the average score of the five best SCTs (out of 6) is at least 45%, AND
- passed all the SCTs with at least 30%, AND
- (s)he has a maximum of 6 seminar absences for a given subject.

Bonus points will be added to the FE score of eligible students and calculated as follows:

<table>
<thead>
<tr>
<th>The average of the best 6 SCTs</th>
<th>Bonus points</th>
</tr>
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<tr>
<td>40.00-40.99</td>
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<tr>
<td>43.00-43.99</td>
<td>4</td>
</tr>
<tr>
<td>44.00-44.99</td>
<td>5</td>
</tr>
</tbody>
</table>

Students who could not meet the above described conditions for exemption must sit for the FE from the whole material of the course. The participation shall be preceded by ID confirmation (i.e. student’s card, passport or driving license) before all forms of tests. Self Control Tests, End of Semester Exams, and Final Exams will be assessed as follows.

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 44.99</td>
<td>fail (1)</td>
</tr>
<tr>
<td>45.00 - 64.99</td>
<td>pass (2)</td>
</tr>
<tr>
<td>65.00 - 74.99</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>75.00 - 84.99</td>
<td>good (4)</td>
</tr>
<tr>
<td>85.00 - 100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

Absence for any reason counts as 0%.

Course coordinator: Dr. Beáta Lontay, Department of Medical Chemistry

Subject: **INTRODUCTION TO BIOLOGY**
Year, Semester: Intensive Basic Medicine Course
Number of teaching hours:
Lecture: **92**
Seminar: **92**

1\(^{st}\) week:
**Lecture:** Small molecules and the chemistry of life 1.
Small molecules and the chemistry of life 2.
Proteins, carbohydrates and lipids 1.
Proteins, carbohydrates and lipids 2.

2\(^{nd}\) week:
**Lecture:** Proteins, carbohydrates and lipids 3.
Nucleic acids and the origin of life.
Cells: the working units of life 1.
Cells: the working units of life 2.

3\(^{rd}\) week:
**Lecture:** Cells: the working units of life 3.

4\(^{th}\) week:
**Lecture:** Cell membranes 2.
Cell membranes 3.
Energy, enzymes and metabolism 1.
Energy, enzymes and metabolism 2.

5\(^{th}\) week:
**Lecture:** Pathways that harvest chemical energy 1.
Pathways that harvest chemical energy 2.
CHAPTER 13

Pathways that harvest chemical energy 3.
The cell cycle and cell division 1.

6th week:
Lecture: The cell cycle and cell division 2.
The cell cycle and cell division 3.
The cell cycle and cell division 4.
Inheritance, genes and chromosomes 1.

7th week:
Lecture: Inheritance, genes and chromosomes 2.
Inheritance, genes and chromosomes 3.
Inheritance, genes and chromosomes 4.
Inheritance, genes and chromosomes 5.

8th week:
Lecture: DNA and its role in heredity 1.
DNA and its role in heredity 2.
DNA and its role in heredity 3.
DNA and its role in heredity 4.

9th week:
Lecture: From DNA to protein: gene expression 1.
From DNA to protein: gene expression 2.
From DNA to protein: gene expression 3.
From DNA to protein: gene expression 4.

10th week:
Lecture: Gene mutation and molecular medicine 1.
Gene mutation and molecular medicine 2.
Gene mutation and molecular medicine 3.
Gene mutation and molecular medicine 4.

11th week:
Lecture: Regulation of gene expression 1.
Regulation of gene expression 2.
Regulation of gene expression 3.
Regulation of gene expression 4.

12th week:
Lecture: The cellular signaling and communication 1.
The cellular signaling and communication 2.
The mechanism of evolution 1.
The mechanism of evolution 2.

13th week:
Lecture: Tissues, organs and organ systems 1-4.

14th week:
Lecture: Homeostasis and cellular physiology.
Temperature Regulation.
Blood, a fluid tissue 1-2.

15th week:
Lecture: Circulation 1-3. Lymphatic system.

16th week:
Lecture: Self control test.
Immunology: gene expression and natural defenses 1.
Immunology: gene expression and natural defenses 2.
Nutrition, Digestion and Absorption 1.

17th week:
Lecture: Nutrition, Digestion and Absorption 2.
Energy balance, vitamins and minerals.
Respiratory system 1-2.

18th week:
Hormones 1-2.

19th week:
Lecture: Hormones 3-4.
Self Control Test
Neurons and Nervous system 1.

20th week:
Lecture: Neurons and Nervous system 2-5.

21st week:
Lecture: Sensory systems 1-2.
Effectors: Musculoskeletal Systems 1-2.

22nd week:
Lecture: Musculoskeletal Systems 3.
Reproduction and Development 1-2.
Reproduction and Development 3-4.

23rd week:
Lecture: Self Control Test
Subject: INTRODUCTION TO BIOPHYSICS
Year, Semester: Intensive Basic Medicine Course
Number of teaching hours:
Lecture: 92
Seminar: 138

1st week:
Lecture 1-2: Introduction to modern physics.
Motion in one dimension, displacement, velocity, acceleration, motion diagrams.

2nd week:
Displacement, velocity and acceleration in two dimensions. Motion in two dimensions. Relative velocity.

3rd week:

4th week:

5th week:

6th week:

7th week:
Lecture 13-14: Torque and the two conditions for equilibrium. The center of gravity. Rotational kinetic energy. Angular momentum.

8th week:

9th week:

10th week:

11th week:

12th week:

13th week:

14th week:

15th week:

16th week:

17th week:

18th week:


19th week:

20th week:

21st week:

23rd week

Academic advisor: Dr. Attila Jenei, Department of Biophysics and Cell Biology
Recommended book: Serway, Vuille: College Physics (11th edition)
ACADEMIC PROGRAM FOR THE SHORT BASIC MEDICINE COURSE

The atomic theory. Structure of the atom, nuclear arithmetic
Mixtures and chemical compounds. Chemical formulas. Naming chemical compounds

3rd week:
Lecture:
Atomic, molecular and molar mass relationships
Percent composition and empirical/molecular formulas. Chemical equations, stoichiometry

4th week:
Lecture:
Summary of general chemistry 1
Test #1

5th week:
Lecture:
The electromagnetic spectrum. Atomic spectra.
The Bohr model of hydrogen atom. The quantum mechanical model of the atom.
Electron configurations and the periodic table. Classification of the elements

6th week:
Lecture:
Periodic properties
Chemical bonds: metallic, ionic, and covalent bond. Electron-dot structures

7th week:
Lecture:
VSEPR and valence bond theory
Intermolecular forces

8th week:
Lecture:
The gaseous state
Liquid and solid state, phase changes. The chemistry of water

9th week:
Lecture:
Solutions. Electrolytes and nonelectrolytes
Summary of general chemistry 2
Test #2

10th week:
Lecture:

Chemical equilibrium
Acids and bases 1

11th week:
Lecture:
Acids and bases 2
Thermochemistry: internal energy and state functions. Enthalpy. Hess’s law

12th week:
Lecture:
Redox reactions. Activity series of the elements. Galvanic cells
Summary of general chemistry 3
Test #3

13th week:
Lecture:
The main-group elements. s-, p-, d-block metals
Nonmetals: hydrogen, halogens and noble gases

14th week:
Lecture:
Nonmetals: oxygen and sulfur
Nonmetals: nitrogen, phosphorus and carbon

15th week:
Lecture:
Covalent bonding in organic compounds.
Classification of organic compounds.
Alkanes. Nomenclature and isomerism of alkanes
Reactions of alkanes. Cycloalkanes

16th week:
Lecture:
Unsaturated hydrocarbons
Summary of organic chemistry 1
Test #4

17th week:
Lecture:
Aromatic compounds: structure and properties
Heteroaromatic compounds. Reactions of benzene and its derivatives

18th week:
Lecture:
CHAPTER 13

Organic halogen compounds
Alcohols and phenols

19th week:
Lecture:
Ethers, thioethers. Organic sulfur compounds
Aldehydes, ketones and quinones

20th week:
Lecture:
Summary of organic chemistry 2
Test #5
Nitrogen containing organic compounds 1:
aliphatic amines

21st week:
Lecture:

Nitrogen containing organic compounds 2:
hetereocyclic nitrogen compounds. Amines of
biological importance
Carboxylic acids

22nd week:
Lecture:
Substituted carboxylic acids. Carboxylic acid
derivatives 1: esters and amides
Carboxylic acid derivatives 2: halides and
anhydrides; salts and detergents

23rd week:
Lecture:
Stereochemistry
Summary of organic chemistry 3
Test #6

Contact person: Dr. Krisztina Tar, Department of Medical Chemistry
Recommended books: McMurry, Fay: Chemistry (7th edition)
Erdődi, Csortos: Organic chemistry for premedical students (2010)
The introduction of the credit system became compulsory in every Hungarian university, including the University of Debrecen by September, 2003. The aim of the credit system is to ensure that the students' achievements can be properly and objectively evaluated both quantitatively and qualitatively.

A credit is a relative index of cumulative work invested in a compulsory, a required elective or a freely chosen subject listed in the curriculum. The credit value of a course is based upon the number of lectures, seminars and practical classes of the given subject that should be attended or participated in (so called "contact hours"), and upon the amount of work required for studying and preparing for the examination(s). Together with the credit(s) assigned to a particular subject (quantitative index), students are given grades (qualitative index) on passing an exam/course/class. The credit system that has been introduced in Hungary meets the standards of the European Credit Transfer System (ECTS). The introduction of the ECTS promotes student mobility, facilitates more effective organization of students' exchange programs aimed at further education in foreign institutions, and allows recognition of the students' work, studies and achievements completed in various foreign departments by the mother institution. Credit-based training is flexible. It provides a wider range of choice, enables the students to make progress at an individual pace, and it also offers students a chance to study the compulsory or required subjects at a different university, even abroad. Owing to the flexible credit accumulation system, the term "repetition of a year" does not make sense any longer. It should be noted, however, that students do not enjoy perfect freedom in the credit system either, as the system does not allow students to randomly include subjects in their curriculum or mix modules. Since knowledge is based on previous studies, it is imperative that the departments clearly and thoroughly lay down the requirements to be met before students start studying a subject.

The general principles of the credit system are the following:

1. Students can be given their degree if, having met other criteria as well, they have collected 300 credits during their studies. Considering the recommended curriculum, this can be achieved in five years.

2. According to the credit regulations, students should obtain an average of 30 credits in each semester.

3. The criterion of obtaining 1 credit is to spend 30 hours (including both contact and non-contact hours) studying the given subject.

4. Credit(s) can only be obtained if students pass the exam of the given subject.

5. Students accumulate the required amount of credits by passing exams on compulsory, required elective and freely chosen subjects. Completion of every single compulsory credit course is one of the essential prerequisites of getting a degree. Courses belonging to the required elective courses are closely related to the basic subjects, but the information provided here is more detailed, and includes material not dealt with in the frame of the compulsory courses. Students do not need to
take all required elective courses, but they should select some of them wisely to accumulate the predetermined amount of credits from this pool. Finally, a certain amount of credits should be obtained by selecting from the freely chosen courses, which are usually not related to the basic (and thus mandatory) subjects, but they offer a different type of knowledge.

6. Total of 300 credits should be accumulated by completing the compulsory and required elective courses (285 credits), and freely chosen courses (15 credits).

7. According to the qualification requirements, professional (compulsory and required elective) courses fall into three modules. The basic module provides the theoretical basis of medicine, and ensures that the necessary practical skills are developed. The preclinical module lays down the foundations of clinical knowledge, while in the clinical module the students are taught clinical medicine, and they attend practical classes to ensure proper command of the medical procedures. The credits accumulated in the different modules for compulsory and required courses should show the following distribution: basic module: 110-116, preclinical module: 50-58, and clinical module: 150-170 credits.

8. The pilot curricula show the recommended pacing of compulsory courses. If these courses are carefully supplemented with credits obtained from the necessary number of required elective and freely chosen courses, students can successfully accumulate the credits required for their degree within 10 semesters.

9. In the case of two-semester subjects, when students have to pass a final exam, they get higher credits in the semester of the final examination since preparation for a final examination takes up more non-contact hours from the students’ time.

10. There are 12 compulsory final examinations in the curriculum; therefore one final exam is worth at least 10 credits.

11. The diploma work is worth 10 credits.

12. Regulations concerning the training of students in the credit system prescribe a minimum amount of credits for certain periods as outlined in the Rules and Regulations for English Program Students.

13. Although Physical Education and Summer Internship are not recognized by credits, they have to be completed to get the final degree (see the rules outlined in the Information section about the conditions).

14. Evaluation of the students' achievements needed for grants or applications is described in Rules and Regulations for English Program Students.

15. Further information is available in the Rules and Regulations for English Program Students.

We very much hope that the system of training will contribute to the successful completion of your studies.

We wish you good luck with your university studies.
This model curriculum applies to those who started their studies on Pharmacy Program in the academic year 2019-20.

For the previous years’ curriculum please visit the university website: www.edu.unideb.hu
### Compulsory courses for the 1. year

<table>
<thead>
<tr>
<th>Sem</th>
<th>Subjects</th>
<th>Neptun code</th>
<th>L</th>
<th>S</th>
<th>P</th>
<th>Exam</th>
<th>Crd</th>
<th>Prerequisites of taking the subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Chemistry Practice</td>
<td>GYAKE04P1</td>
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## Compulsory courses for the 1. year

<table>
<thead>
<tr>
<th>Sem</th>
<th>Subjects</th>
<th>Neptun code</th>
<th>L</th>
<th>S</th>
<th>P</th>
<th>Exam</th>
<th>Crd</th>
<th>Prerequisites of taking the subject</th>
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</thead>
<tbody>
<tr>
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</table>
## Compulsory courses for the 2. year

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<th>Prerequisites of taking the subject</th>
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<tr>
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</table>
## Compulsory courses for the 2. year

<table>
<thead>
<tr>
<th>Sem</th>
<th>Subjects</th>
<th>Neptun code</th>
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<th>Exam</th>
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<th>Prerequisites of taking the subject</th>
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<tbody>
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### Freely Chosen Courses

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Public Pharmacy Practice after 2nd and 3rd year

Syllabus for the practice in a public pharmacy after second and third year

Duration of practice: 4 weeks, 8 hours daily, from which 2 hours may be spent preparing individually.
The student is required to gain proficiency in the following areas during his/her practice at a public pharmacy, and subsequently acquire knowledge about pharmacy operation including dispensing medication, preparing medication, validation and quality assurance, and the overall operation of the pharmacy.

Main requirements for the student:
Before practice he/she should accept and sign the non-disclosure document.
Absence from practice must be authentically justified based on the rules of the place of training.
Absences must be made up.
He/she is expected to follow the guidance of the pharmacist in charge of the training.

Skills expected from the student after the completion of practice:
practical application of the theoretical knowledge obtained during his/her studies
he/she is expected to know the premises and the assets of the public pharmacy and be able to get information from manuals and scientific journals used during his/her work
he/she is expected to learn about the work activities of a public pharmacy
he/she is required to have an appropriate working relationship with the co-workers at the pharmacy
he/she is expected to know the rules and regulations pertaining to the operation of pharmacies
he/she is required to explore the possibilities of communicating with patients

The student’s tasks during the practice:
Under the supervision of the pharmacist in charge of the training he/she participates in the following activities:

1. Preparation of medicine. In the process he/she is required to learn:
   How to prepare magistral/individual formulations according to the rules and to recognize incompatibilities
   The legal possibilities of changing the original prescription
   The rules of labelling and their application (identifiability of manufacturer and patient, application, administration, shelf-life)
   Documentation of preparation, and administrative obligations
   Storage of materials, processing of basic formulations and subsequent administrative obligations
   Formulations of the compendium and FoNo

2. Operation and quality assurance. In the process he/she is required to learn for the basic knowledge:
   administrative work in the pharmacy
   standard procedures for workflow
how to check and document workflow
the rules pertaining to the examining and sampling incoming medications, documentation of examinations

3. Drug dispense. In the process he / she is required to learn for the basic knowledgements:
how to check the content and layout of the prescription
the database of nutrition complements and medicinal formulae
adequate application of the computer program. He / she is expected to get acquainted with the process and documentation of drug dispensing, and communication with patients
the notion of pharmacy care and its practical ramifications

4. Medicine ordering. In the process he / she is required to learn for the basic knowledgements:
how to order medicine
about narcotics and activities involving their handling
the rules pertaining to hazardous waste

Evaluation:
Keeping an electronic notebook: description of one syllabus-related practical problem in half / one page in every two weeks.
The pharmacist in charge of the training checks the work and description every second week and evaluates it using a five-grade system. He /She sends the electronic notebook to the Dean’s Office according to the rules of the place of training.
At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place.

Student evaluation:
After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.

State Exam Practice II. Pharmaceutical Business Administration

1. Syllabus for the practice in a public pharmacy before final examination

Duration of the practice is 2+3 months, 8 hours daily, from which two hours may be spent on preparing individually.
Pharmacy students should gain experience on the following areas in a general pharmacy during their practice and subsequently acquire knowledge about pharmacy operation including: dispensing medication, preparing medication, validation and quality assurance, and the overall operation of the pharmacy.

Main requirements for the student:
He/she should accept and sign the non-disclosure document.
Absence from practice must be authentically justified based on the rules of the place of training.
Absences must be made up.
He/she is expected to follow the guidance of the pharmacist in charge of the training.
The expected skills made on the student after completion of the practice:
practical application of the theoretical knowledge obtained during his / her studies,
the knowledge of the practical application of the rules and regulations concerning the operation of pharmacies,
he / she is required to have an appropriate working relationship with the co-workers at the pharmacy
he / she is expected to communicate with the patients in an appropriate way,
he / she is required to appropriately inform and give advice in connection with the patients’ questions regarding self-healing and preparations without prescription (drugs and other products),
he / she is required to identify „problematic patients” from the point of view of communication and to handle situations properly with help.

The student’s tasks during the practice:
Under the supervision and instructions of the pharmacist in charge of the training he / she participates in the following activities:

1. Drug Dispense. In the process he / she is required to solve the following problems:
how to check the content and layout of the prescription
the application of the rules regarding the replacement of drugs, ordering of drugs on the basis of international non-proprietary name,
appropriate patient information knowing the effects and adverse effects of drugs,
recognition and evaluation of the characteristic interactions based on database (drug-drug, drug-food, drug-food supplement),
characteristic/obligatory cases and methods of medical information and consultation,
duties in connection with the known/identified adverse effects of drugs,
adherence control and means of correction, common uses,
the typical cases of self-healing, the dispensing of the preparations without prescription that can be applied for this purpose,
the possibilities and rules of access to data regarding the patients’ previous medication (OEP database),
the database of nutrition complements and medicinal formulae
proper application of the labelling and dispensing computer program.

2. Preparation of medicine. In the process he / she is required to solve the following problems:
How to prepare magistral / individual formulations according to the rules and to recognize incompatibilities
The legal possibilities of changing the original prescription
The rules of labelling and their application (identifiability of manufacturer and patient, application, administration, shelf-life)
Documentation of preparation, and administrative obligations
Storage of materials, processing of basic formulations and subsequent administrative obligations
Formulations of the compendium and FoNo

3. Operation, quality assurance. In the process he / she is required to solve the following problems:
administrative work in the pharmacy
the rules concerning the staff of the pharmacy; qualification, labor law requirements,
standard procedures for workflow
how to check and document workflow
the rules pertaining to the examining and sampling incoming medications,
documentation of examinations
4. Medication management. In the process he / she is required to solve the following problems: aspects of inventory management, how to order medicine duties in case of waste products, returned items, damage, withdrawal of products from circulation, duties regarding shift of prices, closings: daily, weekly, periodic as well as schedule of OEP reports, importance and practice of supervision of prescriptions, about narcotics and activities involving their handling, the rules pertaining to hazardous waste.

Evaluation: Keeping an electronic workbook: the description of one practical problems in half/one page in every two weeks. One of them should describe a question related to the patient (dispensing drugs), the other topic can be chosen from the three other areas (preparation of medicine, operation, medication management). The descriptions made during the practice should be concerned with all the areas of the activities at a pharmacy. The pharmacist in charge of the training checks the work and description every week and evaluates it using a five-grade system. He / She sends the electronic notebook to the Dean’s Office according to the rules of the place of training.

The student is required to make a 10-15-minute-long presentation for the co-workers of the pharmacy from a professional scientific journal recommended by the pharmacist in charge of the training (the documentation of which will be kept in the workbook) on one occasion. The presentation will take place on a date agreed on by the training location and the student.

At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place.

After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.

2. Syllabus for the practice in a hospital pharmacy before final examination

Duration of the practice is 1 month, 8 hours daily, from which two hours may be spent on preparing individually.
Pharmacy students should gain experience on the following areas in a hospital pharmacy during their practice regarding the characteristics of supplying medicine: system of in-patient care and medicines financing, medication management (acquisition and selling), preparation of individual and multi-dose medicine, therapeutic consultation, system of quality assurance.

Main requirements for the student: He/she should accept and sign the non-disclosure document. Absence from practice must be authentically justified based on the rules of the place of training. Absences must be made up.

Skills expected from the student after the completion of practice: practical application of the theoretical knowledge obtained during his / her studies the knowledge of the practical application of the rules and regulations concerning the operation of
pharmacies,
appropriate communication with the co-workers at the pharmacy and the qualified and unqualified employees of the hospital,
appropriate communication with the in-patients.

The student’s tasks during the practice:
He/she is required to participate in the following activities settled down in the regulations regarding hospital pharmacies (41/2007 Eü M) under the supervision and instruction of the pharmacist in charge of the training:

1. Ordering medicines / storage / dispensing to departments. In the process he / she is required to learn:
   various ways of supplying medicines: „central procurement”, private tenders, supplying medicines in addition to procurement,
   the IT system of medication management,
   the ways of fulfilling the medicine claims of the departments / patients,
   registry of controlled preparations,
   procedure of fulfilling the individual import and „off-label” claims.

2. Individual and multi-dose sterile and non-sterile preparation of medicine. In the process he / she is required to learn:
   the FoNo and manual drug making,
   cytotoxic preparations, preparation of mixture infusion,
   the possible solutions for individual needs.

3. Therapeutic consultant tasks. In the process he / she is required to learn:
   therapeutic protocols (the circle of medicines which can be selected primarily),
   the informational activity of the pharmacy; medicine-substitution, mistakes in connection with medication, side effects, monitoring, signalling, and reporting interactions.

4. Operation / quality assurance. In the process he / she is required to learn:
   the place of the pharmacy in the in-patient institutional hierarchy,
   the financing system of the in-patient care; HBCS, the place of the medicine in the HBCS,
   the planning and documentation of dispensing in the in-patient departments,
   the special techniques for subsidizing medication (itemized financing, individual equity, charities),
   the aim and management of establishing a list of basic medicines,
   the reason for medicine shortages and the handling of it,
   duties in connection with the medicines of clinical medicine trials,
   the participation of the pharmacy in hospital board meeting and work-groups (pharmacotherapeutic, nutritional, etc.),
   job descriptions, duties and competences,
   plans for further trainings, the system of pharmaceutical reporters and professional meetings.

Evaluation:
Keeping an electronic workbook: the description of one practical problems in a half/one page in every two weeks. One of them should describe a therapeutic question in direct connection with the patient, the other topic can be chosen from the three other areas (supplying medicine, making of drugs, operation, making of drugs). The descriptions made during the practice should be concerned with all the areas of the activities in a pharmacy. The instructing pharmacist checks the work and
Public Pharmacy Practices and State Exam Practices

Weekly and evaluates them on a scale of 5. He/she should send the electronic workbook to the Dean’s Office in accordance with the rules of the training location.
The student is required to make a 10-15-minute-long presentation for the co-workers of the pharmacy from a professional scientific journal recommended by the pharmacist in charge of the training (the documentation of which will be kept in the workbook) on one occasion. The presentation will take place on a date agreed on by the training location and the student.
At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place.

Student evaluation:
After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.

State Exam Practice II. Pharmaceutical Management, Quality Assurance

1. Syllabus for the practice in a public pharmacy before final examination

Duration of the practice is 2+3 months, 8 hours daily, from which two hours may be spent on preparing individually.
Pharmacy students should gain experience on the following areas in a general pharmacy during their practice and subsequently acquire knowledge about pharmacy operation including: dispensing medication, preparing medication, validation and quality assurance, and the overall operation of the pharmacy.

Requirements for the student:
Accept and sign the non-disclosure document.
Absence from practice must be authentically justified based on the rules of the place of training.
Absences must be made up.
He/she is expected to follow the guidance of the pharmacist in charge of the training.
The expected skills made on the student after completion of the practice:
practical application of the theoretical knowledge obtained during his / her studies,
the knowledge of the practical application of the rules and regulations concerning the operation of pharmacies,
he / she is required to have an appropriate working relationship with the co-workers at the pharmacy
he / she is expected to communicate with the patients in an appropriate way,
he / she is required to appropriately inform and give advice in connection with the patients’ questions regarding self-healing and preparations without prescription (drugs and other products),
He / she is required to identify „problematic patients” from the point of view of communication and to handle situations properly with help.

The student’s tasks during the practice:
Under the supervision and instructions of the pharmacist in charge of the training he / she participates in the following activities:

1. Drug Dispense. In the process he / she is required to learn:
how to check the content and layout of the prescription
the application of the rules regarding the replacement of drugs, ordering of drugs on the basis of
international non-proprietary name,
appropriate patient information knowing the effects and adverse effects of drugs,
recognition and evaluation of the characteristic interactions based on database (drug-drug, drug-food, drug-food supplement),
characteristic/obligatory cases and methods of medical information and consultation,
duties in connection with the known/identified adverse effects of drugs,
adherence control and means of correction, common uses,
the typical cases of self-healing, the dispensing of the preparations without prescription that can be applied for this purpose,
the possibilities and rules of access to data regarding the patients’ previous medication (OEP database),
the database of nutrition complements and medicinal formulae
proper application of the labelling and dispensing computer program.

2. Preparation of medicine. In the process he / she is required to learn:
How to prepare magistral / individual formulations according to the rules and to recognize incompatibilities
The legal possibilities of changing the original prescription
The rules of labelling and their application (identifiability of manufacturer and patient, application, administration, shelf-life)
Documentation of preparation, and administrative obligations
Storage of materials, processing of basic formulations and subsequent administrative obligations
Formulations of the compendium and FoNo

3. Operation, quality assurance. In the process he / she is required to learn:
administrative work in the pharmacy
the rules concerning the staff of the pharmacy; qualification, labor law requirements,
standard procedures for workflow
how to check and document workflow
the rules pertaining to the examining and sampling incoming medications,
documentation of examinations

4. Medication management. In the process he / she is required to learn:
aspects of inventory management,
how to order medicine
duties in case of waste products, returned items, damage,
withdrawal of products from circulation,
duties regarding shift of prices,
closings: daily, weekly, periodic as well as schedule of OEP reports,
importance and practice of supervision of prescriptions,
about narcotics and activities involving their handling,
the rules pertaining to hazardous waste.

Evaluation:
Keeping an electronic workbook: the description of one practical problems in half/one page in every two weeks. One of them should describe a question related to the patient (dispensing drugs), the other topic can be chosen from the three other areas (preparation of medicine, operation, medication management). The descriptions made during the practice should be concerned with all the areas of the activities at a pharmacy. The pharmacist in charge of the training checks the work and
description every week and evaluates it using a five-grade system. He / She sends the electronic notebook to the Dean’s Office according to the rules of the place of training.

The student is required to make a 10-15-minute-long presentation for the co-workers of the pharmacy from a professional scientific journal recommended by the pharmacist in charge of the training (the documentation of which will be kept in the workbook) on one occasion. The presentation will take place on a date agreed on by the training location and the student.

At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place.

Student evaluation:
After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.

2. Syllabus for the practice in a hospital pharmacy before final examination

Duration of the practice is 1 month, 8 hours daily, from which two hours may be spent on preparing individually.

Pharmacy students should gain experience on the following areas in a hospital pharmacy during their practice regarding the characteristics of supplying medicine: system of in-patient care and medicines financing, medication management (acquisition and selling), preparation of individual and multi-dose medicine, therapeutic consultation, system of quality assurance.

Requirements for the student:
Accept and sign the non-disclosure document.
Absence from practice must be authentically justified based on the rules of the place of training. Absences must be made up.

Skills expected from the student after the completion of practice:
practical application of the theoretical knowledge obtained during his / her studies
the knowledge of the practical application of the rules and regulations concerning the operation of pharmacies,
appropriate communication with the co-workers at the pharmacy and the qualified and unqualified employees of the hospital,
appropriate communication with the in-patients.

The student’s tasks during the practice:
He/she is required to participate in the following activities settled down in the regulations regarding hospital pharmacies (41/2007 Eü M) under the supervision and instruction of the pharmacist in charge of the training:

1. Ordering medicines / storage / dispensing to departments. In the process he / she is required to learn:
   various ways of supplying medicines: „central procurement”, private tenders, supplying medicines in addition to procurement,
   the IT system of medication management,
   the ways of fulfilling the medicine claims of the departments / patients,
   registry of controlled preparations,
procedure of fulfilling the individual import and „off-label” claims.

2. Individual and multi-dose sterile and non-sterile preparation of medicine. In the process he / she is required to learn:
the FoNo and manual drug making,
cytotoxic preparations, preparation of mixture infusion,
the possible solutions for individual needs.

3. Therapeutic consultant tasks. In the process he / she is required to learn:
therapeutic protocols (the circle of medicines which can be selected primarily),
the informational activity of the pharmacy; medicine-substitution, mistakes in connection with medication, side effects, monitoring, signaling, and reporting interactions.

4. Operation / quality assurance. In the process he / she is required to learn:
the place of the pharmacy in the in-patient institutional hierarchy,
the financing system of the in-patient care; HBCS, the place of the medicine in the HBCS,
the planning and documentation of dispensing in the in-patient departments,
the special techniques for subsidizing medication (itemized financing, individual equity, charities),
the aim and management of establishing a list of basic medicines,
the reason for medicine shortages and the handling of it,
duties in connection with the medicines in clinical medicine trials,
the participation of the pharmacy in hospital board meeting and work-groups (pharmacotherapeutic, nutritional, etc.),
job descriptions, duties and competences,
plans for further trainings, the system of pharmaceutical reporters and professional meetings.

Evaluation:
Keeping an electronic workbook: the description of one practical problems in a half/one page every two weeks. One of them should describe a therapeutic question in direct connection with the patient, the other topic can be chosen from the three other areas (supplying medicine, making of drugs, operation, making of drugs). The descriptions made during the practice should be concerned with all the areas of the activities in a pharmacy. The instructing pharmacist checks the work and description weekly and evaluates them on a scale of 5. He/she should send the electronic workbook to the Dean’s Office in accordance with the rules of the training location.
The student is required to make a 10-15-minute-long presentation for the co-workers of the pharmacy from a professional scientific journal recommended by the pharmacist in charge of the training (the documentation of which will be kept in the workbook) on one occasion. The presentation will take place on a date agreed on by the training location and the student.
At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place.

Student evaluation:
After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.
Chapter 16
Academic Program for the 1st Year

Department of Foreign Languages

Subject: Hungarian Crash Course
Year, Semester: 1st year/1st semester
Number of teaching hours: Practical: 36

1st week:
Seminar:
Practical: 1st day: 1. lecke, 2. lecke I. rész
(Greetings, the alphabet, numbers 0-20, colours, everyday expressions, nationalities) - 2nd day:
2. lecke II. rész, 3. lecke (languages, numbers 21-29, names of places, the days of the week, numbers 30-100, the time, hány óra van?) - 3rd day: 4. lecke, 5. lecke I. rész (Test Your Knowledge 1, adjectives and adverbs, verbs expressing activities 1) - 4th day: 5. lecke II. rész, 6. lecke (times of day, hány órakor?, numbers 1000-1000000000, verbs expressing activities 2, everyday expressions, ordinal numbers) - 5th day: 7. lecke, 8. lecke (Revision 1, everyday objects, food and drink, adverbs of frequency)

2nd week:
Practical: 1st day: 9. lecke, 10. lecke I. rész (Food, drink, fruit, vegetables, the menu, ordering in a restaurant, shopping in the market, the uses of tessék, the weather) - 2nd day: 10. lecke II. rész, 11. lecke (the seasons and months, clothes, Test Your Knowledge 2) - 3rd day: 12. lecke, 13. lecke I. rész (body parts, adjectives and descriptions, accessories, jobs, places) - 4th day: 13. lecke II. rész, 14. lecke (personal details and filling in a form, family relations, revision 2) - 5th day: End course exam. Oral exam.

Requirements

9.00 - 10.30: language classes
10.30 - 11.00 break
11.00 - 12.30: language classes

Assessment: five grade evaluation (AW5).
Evaluation: Based on a written final test (80%) + class participation + daily word quizzes (20%).

Passing the oral exam is a minimal requirement for the successful completion of the Hungarian Crash Course. The oral exam consists of a role-play from a list of situations covered in the coursebook. A further minimal requirement is the knowledge of 200 words.

Students who do not attend the Hungarian Crash Course due to their own fault or fail the oral exam have to take an extra course for an additional fee of 500 USD during the first semester.

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CHAPTER 16

Subject: HUNGARIAN LANGUAGE I/1.
Year, Semester: 1st year/1st semester
Number of teaching hours:
Practical: 24

1st week:
Practical: 1. Ismétlés, Már beszélek egy kicsit magyarul

2nd week:
Practical: 2. Már beszélek egy kicsit magyarul

3rd week:
Practical: 2. Magyarórám lesz

4th week:
Practical: 3. Debrecenben lakom

5th week:
Practical: 3. Debrecenben lakom

6th week:
Practical: 4. Már ezt is tudom! + Midterm test

7th week:
Practical: 5. Magyarórán

8th week:
Practical: 6. Honnan jön, és hová megy?

9th week:
Practical: 6. Honnan jön, és hová megy?

10th week:
Practical: 7. Utazás

11th week:
Practical: 7. Utazás

12th week:
Practical: 8. Már ezt is tudom! Endterm test

Requirements

Requirements of the course:

Attendance
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6 occasions, (no matter why) the final signature will be refused and the student must repeat the course.
Absentees can make up the missed classes in the same week with their own teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the coursebook to the class for the second time the attendance is refused.

Testing, evaluation
In each Hungarian language course, students must sit for 2 written language tests, an oral and a listening exam. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test.
A further minimum requirement is the knowledge of 200 words per semester divided into 10 word quizzes. There are five word quizzes before and another five after the midterm test. If students fail or miss any word quizzes they cannot start their written test and have to take a vocabulary exam that includes all 100 words before the midterm and end term tests. A word quiz can be postponed by a week and students can take it only with their own teacher. Students can get bonus points (5-5%) by taking two extra quizzes containing 20 sentences each, before the midterm and end term tests. The sentences are taken from the units of the coursebook.
The oral exam consists of a role-play from a list of situations covered in the coursebook. If students
fail the oral exam, they fail the whole course. The results of the written tests and the oral exam are combined and averaged.
Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-59</td>
<td>fail (1)</td>
</tr>
<tr>
<td>60-69</td>
<td>pass (2)</td>
</tr>
<tr>
<td>70-79</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>80-89</td>
<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score of the written tests is below 60, the student can take a written remedial exam once covering the whole semester’s material.

Coursebook: See the website of the Department of Foreign Languages: ilekt.med.unideb.hu. Audio files to the course book, oral exam topics and vocabulary minimum lists are also available on the website.

Subject: LATIN LANGUAGE I.
Year, Semester: 1st year/1st semester
Number of teaching hours:
Practical: 28

1st week:
Practical: Introduction to Pharmaceutical Terminology and the Latin Alphabet

2nd week:
Practical: Pharmaceutical substances, Grammatical Gender in Latin

3rd week:
Practical: Anatomical Planes and Directions

4th week:
Practical: Prescription Structure and Types, Latin Numerals 1-20

5th week:
Practical: The Human Body (I), Ingredients on Prescriptions

6th week:
Practical: The human body (II)

7th week:
Practical: Revision for the Midterm test

8th week:
Practical: Dosage Forms, Preparation Names in FoNo

9th week:
Practical: Numerals 21-100, Clinical Terminology of Body parts

10th week:
Practical: Pharmacy Preparations and Containers

11th week:
Practical: Body regions, Adjective Formation

12th week:
Practical: Numerals 200-2000, Declension of Numerals and Adjectives

13th week:
Practical: Revision for the Endterm test

14th week:
Practical: Evaluation and closing of the semester
Requirements

Requirements of the course:

Attendance
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6 occasions,(no matter why) the final signature will be refused and the student must repeat the course. Absentees can make up the missed classes in the same week with their own teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the coursebook to the class for the second time attendance is refused.

Testing, evaluation
In each Latin language course, students must sit for 2 written language tests. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test.
A further minimum requirement is the knowledge of 300 words per semester. There is a written word quiz in the first 5-10 minutes of the class, every week. If a student fails 4-4 successful word quizzes till the mid-term and the end-term tests he/she is not allowed to sit in for the test. If students do not have minimum 8 successful word quizzes they have to take a vocabulary exam that includes all 300 words. A word quiz can be postponed by a week and students can take it only with their own teacher. Students can obtain bonus points (5-5%) by taking all the word quizzes successfully. Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
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<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score is below 60, the student can take a remedial exam once covering the whole semester’s material.

Coursebook: See the website of the Department of Foreign Languages: [ilekt.med.unideb.hu](http://ilekt.med.unideb.hu).
Minimum vocabulary lists and further details are also available on the website.

Department of Human Genetics

Subject: **PHARMACEUTICAL BIOLOGY I.**
Year, Semester: 1st year/1st semester
Number of teaching hours:
Lecture: 21
Practical: 28

**1st week:**
Lecture: 1. Introduction into cell biology. The most important organic and inorganic compounds of the living cells I. 2. he most important organic compounds of the living cells II.
**Practical:** 1. Introduction of the subject, methods of studying, compulsory and recommended literature. Getting acquainted, lab safety education. Microscopy I. Theoretical background, components of a microscope. Basics of electron microscopic techniques.

**2nd week:**
**Lecture:** 3. Structural and functional characteristics of the bacterial cell. Biosynthesis of the bacterial cell wall and the antibiotics that inhibit this process. 4. The most important morphological and functional characteristics of the eukaryotic cell. The animal cell.
**Practical:** 2. Microscopy II. The principles of phase contrast, dark field and polarization microscopy. Setting up the microscope. Practicing the use of light microscope.

**3rd week:**
**Lecture:** 5. The most important morphological and functional characteristics of plant and fungal cell. 6. Molecular structure and function of biological membranes. The eukaryotic and prokaryotic cell boundary.
**Practical:** 3. Chemical structure of proteins, nucleic acids, and carbohydrates and their biological significance.
**Self Control Test (Test on Microscopy in extra time)**

**4th week:**
**Lecture:** 7. Transport across membranes. 8. The cytoskeleton: microtubules, microfilaments and intermediate filaments.
**Practical:** 4. Comparison of the prokaryotic and eukaryotic cell. Eukaryotic cell types, organelles, cell components. Study of electron micrographs.

**5th week:**
**Lecture:** 9. Endocytosis, exocytosis, cell surface receptors. 10. Intracellular compartments and protein sorting.
**Practical:** 5. Chemical structure of lipids and their biological significance. The structure of membranes. Transport across membranes. Study of electron micrographs.

**6th week:**
**Lecture:** 11. Extracellular matrix, cell junctions and cell adhesion molecules. 12. Energy, catalysis, and biosynthesis.
**Practical:** 6. The GERL system. Endocytosis. Study of electron micrographs.
**Self Control Test (1st self-control test in extra time)**

**7th week:**
**Practical:** 7. Cytoskeleton, cell junctions and extracellular matrix. Study of electron micrographs. Reaction catalysis.

**8th week:**
**Lecture:** 15. The cell nucleus. 16. Chromatin and chromosomes.
**Practical:** 8. Photosynthesis, glycolysis, fermentation, terminal oxidation. Study of electron micrographs.

**9th week:**
**Lecture:** 17. Replication of prokaryotic and eukaryotic DNA.

**10th week:**
**Lecture:** 18. Transcription in prokaryotes.
**Practical:** 10. Isoelectric point of ovalbumin and optimum pH of the β-galactosidase. Examination on the use of light microscope.
**Self Control Test (2nd self-control test in extra time)**

**11th week:**
**Lecture:** 19. Translation in prokaryotes and eukaryotes.
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12th week:

13th week:
Lecture: No lecture scheduled.

14th week:
Lecture: No lecture scheduled.
Self Control Test (3rd self-control test in extra time)

Requirements

Pharmaceutical Biology I. (first semester subject) is a prerequisite of Pharmaceutical Biology II. (second semester subject).

Conditions of signing the lecture book:

1. Attendance
Concerning attendance, the rules laid out in the EER of the University are clear. The presence of students at laboratory practices and seminars is obligatory and will be recorded. The professor refuses his/her signature in the student's Lecture Book for the semester's course-work in the case of over four weeks of absence, even if the student has an acceptable excuse. If the student is absent from more than two practices or seminars (taken together), the semester will be accepted only if they pass an examination based on the material covered by the laboratory classes and seminars of the semester (lab test).
Successful accomplishment of the laboratory practices will be controlled by signing the laboratory notes. If 3 or more practices will not be accepted, the lecture book will not be signed. These students must sit for a written exam from the laboratory material.
The presence of students on at least 30% of lectures is obligatory and will be recorded. The professor refuses his/her signature in the student's Lecture Book for the semester's course-work if the student was absent from more than 14 lectures, even if the student has an acceptable excuse.

2. Self-control tests
During the semesters there will be 3 self control tests offered. Participation in at least two of them is required for the signature. Based on the % average of the three tests a final grade will be offered according to the next table:

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.00 - 61.99</td>
<td>pass (2)</td>
</tr>
<tr>
<td>62.00 - 69.99</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>70.00 – 79.99</td>
<td>good (4)</td>
</tr>
<tr>
<td>80.00 - 100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

3. Microscopy exam
The students also have to show up their knowledge in handling and setting the light microscope on an oral exam during the practices and also have to write a knowledge test about microscopy (passing limit is 50%). Both oral and written microscopy test have to be successfully completed for the signature. Unsuccessful exams can be repeated two times during the semester.
Exemption requests:
Applications for exemption (based on previous studies in other universities) should be submitted during the first two weeks of the semester. Requests are not accepted after that deadline! Exemption is granted only, if the student can pass an "Assessment of knowledge" test. The passing limit is 50%.

Rules concerning repeaters:
Attendance of labs and seminars for those repeaters who have a signed lecture book from the previous year (i.e. they failed, or they are repeaters because they have never taken Pharmaceutical Biology I. exam) is dispensable. Students should register for the subject electronically during the first weeks of the semester. They can take the three midterm tests in order to qualify for an offered mark based on these tests, or test bonuses and they take the regular exam at the end of the semester. Students, who did not earn a signature in the previous year have to register and attend the labs and seminars and they are considered as the other students registering the course at the first time.

End of semester examination (ESE)
There will be a written examination at the end of the first semester which covers all the material of the semester taken in the lectures, seminars, and laboratory practices (for a detailed list see the University Bulletin). The examination questions include multiple choice, and short essay questions, figures, definitions, etc. The marks are based on the student's performance, expressed in percentage (%) as shown in the table below:

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 49.99</td>
<td>fail (1)</td>
</tr>
<tr>
<td>50.00 - 61.99</td>
<td>pass (2)</td>
</tr>
<tr>
<td>62.00 - 69.99</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>70.00 - 79.99</td>
<td>good (4)</td>
</tr>
<tr>
<td>80.00 - 100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

The percentage values include the student's performance at the ESE as well as the bonus percentage they have obtained by taking the three mid-semester tests.
The following table shows the bonus percentage based on the average result of the semester tests. Absence counts as 0%. Bonuses are calculated only in the year of acquisition.

<table>
<thead>
<tr>
<th>Average of the 3 tests (%)</th>
<th>Bonus %</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.00 - 43.99</td>
<td>1</td>
</tr>
<tr>
<td>44.00 - 47.99</td>
<td>2</td>
</tr>
<tr>
<td>48.00 - 51.99</td>
<td>3</td>
</tr>
<tr>
<td>52.00 - 55.99</td>
<td>4</td>
</tr>
<tr>
<td>56.00 - 59.99</td>
<td>5</td>
</tr>
<tr>
<td>60.00 - 63.99</td>
<td>6</td>
</tr>
<tr>
<td>64.00 - 67.99</td>
<td>7</td>
</tr>
</tbody>
</table>
ESE grade may be considered as part of the final exam mark upon the request of the student (see Pharmaceutical Biology II.).

The slides of the lectures and up-to-date information can be found at https://elearning.med.unideb.hu, username and password is your network-id (same as Neptun-id) and password. You will be able to check the content after the Neptun has registered you to the subject.

Departmental homepage: https://humangenetics.unideb.hu

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Department of Inorganic and Analytical Chemistry

Subject: GENERAL CHEMISTRY PRACTICE
Year, Semester: 1st year/1st semester
Number of teaching hours:
Seminar: 14
Practical: 56

1st week:
**Seminar:**
Determination of atomic weight, molecular weight, empirical formula, molecular formula, amount of substance. Determination of empirical formula based on weight percent composition and on elemental analysis.

**Practical:**
General introduction to the laboratory rules and laboratory work. Safety training. Introduction to laboratory pieces of equipment. The use of gas burners. Overview of pieces of the received laboratory equipment.

2nd week:
**Seminar:** General introduction to the units of concentration. Interconversion of units. Calculation problems connected to solution preparation. Introduction of the SI system. Mass concentration, molarity, mass percent composition, molar percent composition.

**Practical:**
Mass and volume measurements: weighing on analytical and standard laboratory balances; introduction to volume measurement devices (pipette, burette, volumetric flask). Calibration of volumetric measuring equipment (pipette or volumetric flask). Calculation the standard error between the measured and nominal values.

3rd week:
**Seminar:** Review exercises concerning on the first two weeks. Interconversion of concentration units. Density measurements. Mixing equations.

**Practical:**
Introduction to solution preparation: grinding, use of mortar, pestle, volumetric flask. Preparation of a standard solution from a crystalline salt. Introduction to a density measurement. The use of the pycnometer. Determination of the density of the prepared solution by the help of the pycnometer. Calculating the weight percent composition of the prepared solution.

4th week:
**Seminar:** Theoretical background of crystallization. Exercises calculation problems of crystallization.

**Practical:** Introduction to separation methods: decantation, centrifuging, filtration. Purification of solids. Theoretical background heating, cooling and the use of hot water bath.
Purification of a benzoic acid sample contaminated with sodium chloride. Preparation of a double salt from simple salts and basic laboratory procedures.

**5th week:**
**Seminar:** Theoretical backgrounds of gas and solids. Composition of solid and gas mixtures. Introduction to basic chemical equations. Stoichiometric calculations based on chemical equations. Preparation of salts, calculation of theoretical and percent yield. Dissolving of metal mixtures in acids.

**Practical:** Writing the general mid-term test based on the studied material of the laboratory practice and seminar until week 4. Determination of the composition of mixture of potassium chloride and potassium chlorate. Review of different methods used to temperature measurements. Introduction to the measurements of melting point of the solid substances. Determination of the melting point of the purified benzoic acid sample. Determination of the contamination percentage of the purified benzoic acid sample.

**6th week:**
**Seminar:** Acid-base equilibria. Theory of acid-base reactions and titrations. Exercises based on acid-base titrations. Stoichiometric calculations based on chemical equations. Determination of molar weight based on titration results.

**Practical:** Demonstration of acid-base titration. Preparation of a standard solution of NaOH. Concentration determination of the standard NaOH solution by acid-base titration. Determination of the molar weight of the recrystallized sample of benzoic acid by acid-base titration. Comparing the result with the literature value and calculating the standard error between the given and measured data. Purified benzoic acid due in.

**7th week:**
**Seminar:** Review exercises in stoichiometry and concentration calculations.

**Practical:** Laboratory work with gases: introduction to the use of gas cylinders, simple gas generator, Kipp’s apparatus. Studying the chemical and physical properties of gases. Demonstration of hydrogen preparation. The hydrogen explosion test. Preparation of oxygen in a laboratory gas generator and burning of sulphur in oxygen. Study of the observations during the reaction (oxidation product of sulphur). Determination of molecular weight based on the ideal gas law.

**8th week:**
**Seminar:** Introduction to basic gas laws. Laboratory preparation of gases. Calculation problems connected to evolution of gases based on chemical equations.

**Practical:** Practice the basic laboratory techniques considering the preparation of a salt. Preparation of salts from its metal. Studies of reactions involving gas formation and precipitation.

**9th week:**

**Practical:** Quantitative study of a precipitation reactions to determine the stoichiometric composition of water insoluble precipitates using the method of continuous variation. Dependence of reaction rate of concentration of reactants. Studying the factor affecting the reaction rates. Determination of the reaction rate and the rate law of the studied reaction. Metal salts preparations due in.

**10th week:**
**Seminar:** Review exercises in balancing of redox and acid-base reactions.

**Practical:** Theoretical background of liquid-liquid extractions and demonstration of the separation techniques. Introduction to buffer systems, buffer capacity by studying a particular buffer system (acetate buffer; ammonium ion/ammonia buffer). Hydrolysis of salts to study the acid-base properties of ionic and covalent compounds in aqueous solutions or in reactions with water. Writing of the ionic equations based on the observed chemical reactions.
CHAPTER 16

11th week:
Seminar: Definition of pH. Theoretical background of pH calculation. Introduction to water ionisation constants. Relationship between the Kw and H+.
Practical: General test from week 5 to week 10. General introduction to electrochemistry. Study of redox reactions. Prediction of the direction of spontaneous processes based on standard potentials. Factors affecting the order of the deposition of different metals during electrolysis (study of Daniell cell). Return of the received pieces of laboratory equipment.

12th week:
Seminar: Calculation of pH of strong acids and strong bases.

13th week:
Seminar: Calculation of pH of weak acids and weak bases. Determination of dissociation rate. Theoretical background of buffer systems, buffer capacity. Calculation problems regarding the pH of buffer systems.

14th week:

Requirements

The objective of the laboratory work is to introduce first-year students of different background to laboratory work, the use of basic laboratory equipment, simple laboratory operations and measurements. In addition, students are expected to prepare certain simple chemicals and run various basic experiments to familiarize themselves with chemical laboratory work. The seminar involves solving exercises and problems connected to stoichiometry, concentration measurement and pH calculation. The laboratory practice will be held in 11 weeks. The lab manual will be made available to the students gradually during the semester as an English translation of the Hungarian original. The preparatory material to be studied before laboratory work is over-viewed before each experiment description in this manual. The weekly syllabus lists the particular topics covered and gives a full description of the experiments. The word ‘demonstration’ in the syllabus refers to experiments that the instructors carry out for the students. Students should come to lab sessions fully prepared. Students should learn the core theoretical background of the experiments (reading the material once is insufficient) and solve the pre-lab exercises in the lab manual every week before the lab session. The sections ‘Laboratory notes’ and ‘Review exercise and problems’ should be completed during the laboratory session. After each session the instructors overview the lab notes and make corrections if necessary. Students can ask questions regarding the laboratory preparation material during the seminar each week before the lab session. Each week the laboratory session begins with a short test (not more than 15 minutes) based exclusively on the preparatory material of that week and the previous week and the results of the experiments carried out the previous week. During the semester, students are required to write two general tests (week 8 and week 14) which are based on the course material for weeks 1-8 and 9-14, respectively. Grading is based on a five-level scale: 1 (fail), 2 (pass), 3 (average), 4 (good), 5 (excellent). The final course grade is given based on the results of these tests, the quality of the laboratory notes and the quality of laboratory work. The average score from both the short tests and the general tests must be above 2.00 to avoid a ‘fail’ final course grade. Students with ‘fail’ final course grade due to inadequate laboratory work have to retake the course the next year. Students with ‘fail’ final course grade due to low test results can re-take a comprehensive test exam in the examination period. It is not allowed to miss any laboratory practices/seminars. If a student misses one lab practice, medical certification is needed. If a student misses two or more lab practices/seminars even for any medical
ACADEMIC PROGRAM FOR THE 1ST YEAR

Reasons, the student’s lecture book won’t be signed and she or he has to retake the course next year.

Subject: GENERAL CHEMISTRY THEORY
Year, Semester: 1st year/1st semester
Number of teaching hours:
Lecture: 42

1st week:
Lecture: Classification of natural sciences, history and development of chemistry. The concept of chemical change. The SI system of units, the most important physical quantities and units. Conservation of mass and energy. The law of definite proportions, the law of multiple proportions, law of combining gas volumes, Avogadro’s law. Dalton’s atomic theory. Relative atomic and molecular weights. Amount of substance and the definition of mole. Notations for elements and compounds, symbol, empirical formula, molecular formula, structure, isomerism.

2nd week:

3rd week:

4th week:

5th week:
Lecture: Electronegativity, ionization energy, electronaffinity, atomic and ionic radii and their change across the periodic table. The ionic bond. Calculation of the lattice energy. Metallic bonding.

6th week:

7th week:

8th week:
CHAPTER 16

Changes of state: melting, freezing, evaporation, condensation, sublimation.

9th week:

10th week:

11th week:

12th week:

13th week:

14th week:

Department of Pharmaceutical Technology

Subject: PHARMACY PROPEDEUTICS
Year, Semester: 1st year/1st semester
Number of teaching hours:
Lecture: 28

1st week:
Lecture: The methods of Greek, Roman and Arab treatments.

2nd week:
Lecture: Pharmaceutics in ancient times and in middle ages.

3rd week:
Lecture: The development of anatomical and morphological thinking.

4th week:
Lecture: The development of bacteriological thinking.
ACADEMIC PROGRAM FOR THE 1ST YEAR

5th week:
Lecture: The development of physiological thinking.

6th week:
Lecture: The history of the development of medical departments.

7th week:
Lecture: Factors that helped in the development of theoretical and practical pharmacy in Hungary.

8th week:
Lecture: The development of pharmacies.

9th week:
Lecture: The pharmaceutical career as a profession.

10th week:
Lecture: The structural build-up of the Hungarian public health.

11th week:
Lecture: Drug as remedy.

12th week:
Lecture: Grouping of drugs. (origin, therapeutic effect, the area of utilization, the method of administration)

13th week:
Lecture: Drug supply. The functional conditions of pharmacies (personal, material).

14th week:

Requirements

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam. Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.

Department of Solid State Physics

Subject: PHYSICS
Year, Semester: 1st year/1st semester
Number of teaching hours:
Lecture: 14
Practical: 28

1st week:

2nd week:

3rd week:

4th week:
Lecture: Conserved quantities. Momentum, angular momentum, work and energy.
5th week:  

6th week:  
Lecture: Vibrations: Harmonic vibration, force law and energy conservation.

7th week:  

8th week:  
Lecture: Electrostatics. Charges, Coulomb's law, electrostatic potential.

9th week:  
Lecture: Electromagnetism. The Lorentz force, magnetic fields. Induction, electromagnetic waves.

10th week:  

11th week:  

12th week:  

13th week:  

14th week:  
Lecture: Nuclear physics: Radioactivity. Radiations. The mass defect. The structure of the nucleus.

Requirements

Aim of the course is to introduce the basic concepts and quantities for natural science studies. Aim of the practice is to provide skills to apply physical laws to simple situations to derive quantitative result, and use physical quantities properly.

Course topics
1. Kinematics, description of motion, velocity, acceleration, path, path length
2. Planar motion, projectiles, rotation, vibration.
4. Conserved quantities. Energy, momentum, work and potential energy,
7. Elastic media, the hooks law, waves, wave propagation, wave equation, harmonic waves.
11. Light as an electromagnetic wave, and light as a quanta. Connection between the color and the wavelength, The photon, Photoelectric effect.
13. The nucleon. Law of radioactive decay. binding energy and the mass defect. Description of the nuclear forces.
14. Consultation
Requirements for the practice is the completion of two problem solving tests during the semester. The course is graded based on the written exam results.

Division of Biomathematics

Subject: MATHEMATICS
Year, Semester: 1st year/1st semester
Number of teaching hours:
Lecture: 28
Practical: 28

1st week:
Lecture: Introduction to mathematics: sets and classification of numbers. Order of operations, rounding numbers, scientific notation, direct and inverse proportionality, units and their conversions, prefixes.
Practical: Introduction to mathematics: sets and classification of numbers. Order of operations, rounding numbers, scientific notation, direct and inverse proportionality, units and their conversions, prefixes.

2nd week:
Lecture: Linear and quadratic equations, systems of equations. Logarithms and exponentials.
Practical: Linear and quadratic equations, systems of equations. Logarithms and exponentials.

3rd week:
Lecture: Vectors, coordinate geometry and functions (basic types, transformations, inverse functions). Slope and equations of a line. Fundamentals of trigonometry. Area and volume of geometrical figures. The concept of limit, some limit theorems, continuity, some theorems on continuous functions.
Practical: Vectors, coordinate geometry and functions

4th week:
Lecture: Infinite series, compound interest, limit of sequences.
Practical: Infinite series, compound interest, limit of sequences.

5th week:
Lecture: Some definitions of derivatives, limit of sequences.
Practical: Some definitions of derivatives, limit of sequences.

6th week:
Lecture: The Chain rule, derivatives of trigonometric functions, Implicit differentiation and higher derivatives.
Practical: The Chain rule, derivatives of trigonometric functions, Implicit differentiation and higher derivatives.

7th week:
Lecture: Differentials and Newton-Raphson approximations, L’Hopital’s rule, application of
CHAPTER 16

derivatives.
Practical: Differentials and Newton-Raphson approximations, L’Hopital’s rule, application of derivatives.

8th week:
Lecture: Integration, an area problem, definition of definite integral, some theorems on integral calculus, fundamental theorem of calculus.
Practical: Integration, an area problem, definition of definite integral, some theorems on integral calculus, fundamental theorem of calculus.

9th week:
Lecture: Area between graphs, more applications of integral calculus.
Practical: Area between graphs, more applications of integral calculus.

10th week:
Lecture: Formal integration, indefinite integrals, integration by parts, trigonometric integrals.
Practical: Formal integration, indefinite integrals, integration by parts, trigonometric integrals.

11th week:
Lecture: Integration by trigonometric substitution, partial fraction.
Practical: Integration by trigonometric substitution, partial fraction.

12th week:
Lecture: Numerical integration, trapezoidal rule, Simpson’s rule.
Practical: Numerical integration, trapezoidal rule, Simpson’s rule.

13th week:
Lecture: Differential equations.
Practical: Differential equations.

14th week:
Lecture: Application of differential equations in biochemistry, Michaelis-Menten equation of enzyme kinetics.
Practical: Application of differential equations in biochemistry, Michaelis-Menten equation of enzyme kinetics.

Requirements

1. Lectures: Attendance to lectures is emphatically recommended. All material covered in the lectures is an integral part of the subject and therefore included in the self-control tests and the final exam. Some concepts and ideas are discussed in the lectures only and are not in the textbook. If a student is present on every lecture, he/she receives 10 bonus points (5 points for week 2-5 and 5 for week 8-15) which is added to the result of the final exam and/or the course test according to point 5. Attendance to the lectures will be checked randomly. No kind of certificate, including a medical certificate, is accepted for the absences.

2. Seminars: Attendance to seminars is compulsory, however a student may miss maximum 4 (four) seminars. The teacher will discuss the material of the lectures in more detail on seminars. In the seminars, students are encouraged to ask questions related to the topic of the lectures discussed.

3. Exemptions: Applications for exemption from the mathematics course has to be turned in to the Credit Transfer Committee. Such requests are not accepted by the Biomathematics Division or the Department of Biophysics and Cell Biology. The deadline for such applications is Friday on the third week. No application will be considered after this date.

4. Requirements for signing the lecture book: Maximum 4 absences are allowed from the seminars. If the number of absences from the seminars is more than four, we will not sign the lecture book.

5. Self-control tests (STC) and final exam (FE): Students will have two STCs during the semester. One on week 7 and the other one on week 13 whose structure will be identical to those of the final exam. None of the SCTs are obligatory. Each SCT will be graded (0-100 %, 0% for
absence) and the results of the two SCTs will be averaged (Xave). The missed test will be counted as 0% in the average. Missed SCTs cannot be made up at a later time. Based on the SCTs students may obtain the following grades:

<table>
<thead>
<tr>
<th>Xave percentage</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-59.99</td>
<td>FAIL(1)</td>
</tr>
<tr>
<td>60-69.99</td>
<td>PASS(2)</td>
</tr>
<tr>
<td>70-79.99</td>
<td>SATISFACTORY(3)</td>
</tr>
<tr>
<td>80-89.99</td>
<td>GOOD(4)</td>
</tr>
<tr>
<td>90-100</td>
<td>EXCELLENT(5)</td>
</tr>
</tbody>
</table>

Students who could not meet the above described conditions for exemption during the two semesters must sit for the FE from the whole material of the semester. Students have three chances (A, B, C) for passing the mathematics FE in the winter exam period after the semester in which the course was taken. On the FE students may obtain the following grades:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-49.99</td>
<td>FAIL(1)</td>
</tr>
<tr>
<td>50-64.99</td>
<td>PASS(2)</td>
</tr>
<tr>
<td>65-74.99</td>
<td>SATISFACTORY(3)</td>
</tr>
<tr>
<td>75-84.99</td>
<td>GOOD(4)</td>
</tr>
<tr>
<td>85-100</td>
<td>EXCELLENT(5)</td>
</tr>
</tbody>
</table>

6. **Compulsory reading:**

7. **Rules for calculator usage during course tests and the final examination**
In order to ensure a fair evaluation, to avoid disturbances in the testing room, and to protect the security of the test material the following types of calculators are NOT permitted:
- Calculators with built-in computer algebra systems (capable of simplifying algebraic expressions)
- Pocket organizers, handheld or laptop computers
- Any device capable of storing text. Calculators with a typewriter keypad (so-called QWERTY devices), electronic writing pads and pen-input devices are not allowed either. Calculators with letters on the keys (e.g. for entering hexadecimal numbers or variable names) are permitted as long as the keys are not arranged in QWERTY forma
- Calculators or other devices capable of communicating with other device
- Calculators built into wireless phone
- Calculators with paper tape or models that make noise
In general, students may use any four-function, scientific or graphing calculator except as specified above. Sharing calculators during tests is not allowed, and the test proctor will not provide a calculator.
CHAPTER 16

Department of Anatomy, Histology and Embryology

Subject: PHARMACEUTICAL ANATOMY
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Lecture: 42
Practical: 28

1st week:
Practical: -

2nd week:

3rd week:

4th week:

5th week:
Lecture: 1. Gastrulation, formation of the mesoderm. 2. Differentiation of the ectoderm and mesoderm. 3. Differentiation of the entoderm, folding of the embryo.

6th week:

7th week:

8th week:
Lecture: 1. Nasal and oral cavities. 2. The pharynx and the larynx. 3. The heart I.
Seminar: 
Practical: Anatomy: Upper and lower limbs. The bones, joints, muscles, blood vessels and nerves of the upper limb. Sites of venous
injections and measurement of blood pressure. Bones, joints, ligaments and membranes of the pelvis. The structure and function of the pelvic girdle. The bones, joints, muscles, blood vessels and nerves of the lower limb. Sites of muscular injections. Femoral canal.

**Self Control Test (1st written midterm SCT)**

**9th week:**
**Lecture:** 1. The heart II. 2. The trachea, lungs and pleura. 3. Histology of the lung.

**10th week:**
**Lecture:** 1. Development of the lung and heart. 2. Circulatory system. The vascular system of the embryo. 3. The oesophagus. The stomach.

**11th week:**
**Lecture:** 1. Small and large intestines. 2. The pancreas. The liver I. 3. The liver II. The system of the portal vein.
**Practical: Anatomy:** The anatomy of the heart and the respiratory system. The structure of the wall of the thorax. Lymphatic drainage of the mammary gland. The lungs, pleura and pleural recesses. The root of the lung. The heart. The pericardium and its sinuses. The mediastinum and its major parts.

**12th week:**
**Lecture:** 1. The peritoneum. The retroperitoneum. 2. Neuroendocrine regulation. The hypothalamo-hypophyseal system. 3. The pineal, thyroid, parathyroid and suprarenal glands.

**13th week:**
**Lecture:** 1. The kidney. 2. The urinary system. 3. Male genital organs.

**14th week:**
**Lecture:** 1. Female genital organs I. 2. Female genital organs II. 3. Development of the urogenital system.

**Anatomy:** The anatomy of the alimentary system and the urogenital apparatus. The structure and layers of the abdominal wall. The stomach, the duodenum, the liver, the pancreas and the spleen. Demonstration of some parts of the small and large intestines. The peritoneum. The abdominal aorta and its branches. Lymphatic drainage of the abdominal cavity. The diaphragm. Location and capsules of the kidney. The kidney in a transverse section. Visceral relation of pelvic organs. Demonstration of male and female pelvic organs. Demonstration of external genital organs. Internal iliac artery. Sacral plexus.

**Self Control Test (2nd written midterm SCT)**
Requirements

Concerning attendance, the rules written in the Regulations Governing Admission, Education and Examinations of the University are valid. The presence on seminars and lectures will be recorded. The head of the department may refuse the end-semester signature if a student is absent more than twice from seminars in one semester even if he/she has an acceptable reason. The program of the lectures, seminars are written in the University Calendar.

Rules of examinations:
Midterm examinations:
Two midterm examinations will be held, one on the 8th week and the other on the 14th week. The written exams cover the topics of lectures, seminars and official textbooks of the second semester. Evaluation of the midterm examinations.
The midterm exams will be evaluated with points and the points of the two examinations will be added. Students with scores higher than 60% earn an exemption from the final examination with a mark that will be calculated on the basis of the overall performance on the two midterm examinations.

End-semester exam:
The end-semester exam is a written exam that covers the topics of lectures, seminars of the semester. The exam will be evaluated with points that will be converted into final mark in the following way:
0 – 59% fail (1)
60 – 69% pass (2)
70 – 79% satisfactory (3)
80 – 89% good (4)
90 – 100% excellent (5)

Registration for the exam and postponement: Through the NEPTUN system.

Reading materials
M. Petkó: Histology, University of Debrecen

Department of Foreign Languages
Subject: **HUNGARIAN LANGUAGE I/2.**
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Practical: 28
ACADEMIC PROGRAM FOR THE 1ST YEAR

1st week:  
Practical: 1. Emlékszel?

2nd week:  
Practical: 2. Napirend

3rd week:  
Practical: 3. Melyik a jobb?

4th week:  
Practical: 3. Melyik a jobb?

5th week:  
Practical: 4. A testem

6th week:  
Practical: 5. Beteg vagyok

7th week:  
Practical: 6. Ismétlés a tudás anyja Midterm test

8th week:  
Practical: 7. A család

9th week:  
Practical: 7. A család

10th week:  
Practical: 8. Csak azért is zumbázni akarok

11th week:  
Practical: 9. Mit csináltál tegnap?

12th week:  

13th week:  
Practical: 10. Vizsga lesz! End term test

14th week:  
Practical: Oral exam

Requirements

Requirements of the course:

Attendance
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6 occasions, (no matter why) the final signature will be refused and the student must repeat the course.

Absentees can make up the missed classes in the same week with their own teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the coursebook to the class for the second time the attendance is refused.

Testing, evaluation
In each Hungarian language course, students must sit for 2 written language tests, an oral and a listening exam. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test.

A further minimum requirement is the knowledge of 200 words per semester divided into 10 word quizzes. There are five word quizzes before and another five after the midterm test. If students fail or miss any word quizzes they cannot start their written test and have to take a vocabulary exam that includes all 100 words before the midterm and end term tests. A word quiz can be postponed by a week and students can take it only with their own teacher. Students can get bonus points (5-5%) by taking two extra quizzes containing 20 sentences each, before the midterm and end term tests. The sentences are taken from the units of the coursebook.

The oral exam consists of a role-play from a list of situations covered in the coursebook. If students fail the oral exam, they fail the whole course. The results of the written tests and the oral exam are combined and averaged.
Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-59</td>
<td>fail (1)</td>
</tr>
<tr>
<td>60-69</td>
<td>pass (2)</td>
</tr>
<tr>
<td>70-79</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>80-89</td>
<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score of the written tests is below 60, the student can take a written remedial exam once covering the whole semester’s material.

**Coursebook:** See the website of the Department of Foreign Languages: [ilekt.med.unideb.hu](http://ilekt.med.unideb.hu).
Audio files to the course book, oral exam topics and vocabulary minimum lists are also available on the website.

**Subject:** LATIN LANGUAGE II.
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Practical: 28

1st week:
**Practical:** Revision

2nd week:
**Practical:** Anatomy of the GI tract, Gastrointestinal disorders

3rd week:
**Practical:** Accusative case, Numbers with multiple forms

4th week:
**Practical:** Routes of administration, Effect-denoting expressions of the GI tract

5th week:
**Practical:** Latin conjugation system; Imperatives and participles on prescriptions

6th week:
**Practical:** Prescriptions related to the GI tract

7th week:
**Practical:** Respiratory system; Prepositions requiring accusative case

8th week:
**Practical:** Revision for the midterm test

9th week:
**Practical:** Respiratory conditions and the medications of the respiratory system

10th week:
**Practical:** Prepositions requiring ablative case

11th week:
**Practical:** Skin (anatomy, related problems, action and use expression, prescriptions)

12th week:
**Practical:** Cardiovascular system., Prescribing powders and suppositories in different dose forms

13th week:
**Practical:** Revision for the End term test

14th week:
**Practical:** Evaluation and closing of the semester
Requirements

Requirements of the course:

Attendance
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6 occasions, (no matter why) the final signature will be refused and the student must repeat the course.

Absentees can make up the missed classes in the same week with their own teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the coursebook to the class for the second time attendance is refused.

Testing, evaluation
In each Latin language course, students must sit for 2 written language tests. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test.

A further minimum requirement is the knowledge of 300 words per semester. There is a written word quiz in the first 5-10 minutes of the class, every week. If students fail 4-4 successful word quizzes till the mid-term and the end-term tests they are not allowed to sit in for the test. If students do not have minimum 8 successful word quizzes they have to take a vocabulary exam that includes all 300 words. A word quiz can be postponed by a week and students can take it only with their own teacher. Students can obtain bonus points (5-5%) by taking all the word quizzes successfully.

Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 59</td>
<td>fail (1)</td>
</tr>
<tr>
<td>60-69</td>
<td>pass (2)</td>
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<td>satisfactory (3)</td>
</tr>
<tr>
<td>80-89</td>
<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score is below 60, the student can take a remedial exam once covering the whole semester’s material.

Coursebook: See the website of the Department of Foreign Languages: ilekt.med.unideb.hu. Minimum vocabulary lists and further details are also available on the website.

Department of Human Genetics

Subject: PHARMACEUTICAL BIOLOGY II.
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Lecture: 35
Practical: 28
1st week:

2nd week:
Practical: Seminar: Cytogenetics.

3rd week:
Practical: Seminar: Transmission genetics.

4th week:
Lecture: (9) Human mendelian traits and diseases. Inborn errors of metabolism II. (10) Genetics of blood groups and HLA system. (11) DNA polymorphisms.
Practical: Seminar: Pedigree analysis. Problem solving and seminar on mendelian genetics.

5th week:
Practical: Study of sex chromatin. Demonstration of mammalian chromosomes. Preparation of metaphase spreads. (Laboratory practical.)
Self Control Test (1st self-control test in extra time.)

6th week:
Practical: Complementation test. The gene concept. (Laboratory practical.)

7th week:
Lecture: (19) Gene regulation in eukaryotes II. (20) Homologous and specific recombination. IS elements, transposons. (21) Gene engineering (Recombinant DNA) I.
Practical: Induction of beta-galactosidase in E. coli cells. (Laboratory practical.)

8th week:
Lecture: (22) Gene engineering (Recombinant DNA) II. (23) Application of recombinant DNA in biotechnology and biomedical sciences I. (24) Application of recombinant DNA in biotechnology and biomedical sciences II.

9th week:

10th week:
Practical: Seminar: Recombinant DNA.
Self Control Test (2nd self-control test in extra time.)

11th week:
Lecture: (30) Evolutionary genetics. (31) Pharmacogenetics, pharmacogenomics.
Practical: Detection of human polymorphism by polymerase chain reaction. (Laboratory practical.)

12th week:
Lecture: (32) Ecogenetics and ecogenomics. Genetic polymorphism of human populations. (33) Genomics, proteomics, the human genome project.
Practical: Transformation of Escherichia coli. PCR evaluation of the human polymorphism experiment. (Laboratory practical.)
13th week:
**Lecture:** (34) Systembiological approach to disease. (35) Network analysis.
**Practical:** Seminar: Cell cycle regulation and cancer.

14th week:
**Practical:** Seminar: Genomics.
**Self Control Test (3rd self-control test in extra time.)

**Requirements**

The prerequisite of Pharmaceutical Biology II. (second semester subject) is Pharmaceutical Biology I. (first semester subject). Students are not allowed to register until they have a successful ESE in Pharmaceutical Biology I.

**Conditions of signing the lecture book:**

1. **Attendance**
   Concerning attendance, the rules laid out in the EER of the University are clear. The presence of students at laboratory practices and seminars is obligatory and will be recorded. The professor refuses his/her signature in the student's Lecture Book for the semester's course-work in the case of over four weeks of absence, even if the student has an acceptable excuse. If the student is absent from more than two practices or seminars (taken together), the semester will be accepted only if they pass an examination based on the material covered by the laboratory classes and seminars of the semester (lab test).
   Successful accomplishment of the laboratory practices will be controlled by signing the laboratory notes. If 3 or more practices will not be accepted, the lecture book will not be signed. These students must sit for a written exam from the laboratory material.
   The presence of students on at least 30% of lectures is obligatory and will be recorded. The professor refuses his/her signature in the student's Lecture Book for the semester's course-work if the student was absent from more than 24 lectures, even if the student has an acceptable excuse.

2. **Self-control tests**
   During the semesters there will be 3 self control tests offered. Participation in at least two of them is required for the signature.

**Exemption requests:**
Applications for exemption (based on previous studies in other universities) should be submitted during the first two weeks of the semester. Requests are not accepted after that deadline! Exemption is granted only, if the student can pass an "Assessment of knowledge" test. The passing limit is 50%.

**Rules concerning repeaters:**
Attendance of labs and seminars for those repeaters who have a signed lecture book from the previous year (i.e. they failed, or they are repeaters because they have never taken Pharmaceutical Biology II. exam) is dispensable. Students should register for the subject electronically during the first weeks of the semester. They can take the three midterm tests in order to qualify for test bonuses and they take the regular exam at the end of the semester. They cannot have home-work bonuses. Students, who did not earn a signature in the previous year, have to register and attend the labs and seminars and they are considered as the other students registering the course at the first time.
Final Examination (FE):
There will be a written examination at the end of the semester which covers all the material of the two semesters taken in the lectures, seminars, and laboratory practices (for a detailed list see the University Bulletin). The examination questions include multiple choice, and short essay questions, figures, definitions, etc. The marks are based on the student's performance, expressed in percentage (%) as shown in the table below:

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 49.99</td>
<td>fail (1)</td>
</tr>
<tr>
<td>50.00 - 61.99</td>
<td>pass (2)</td>
</tr>
<tr>
<td>62.00 - 69.99</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>70.00 - 79.99</td>
<td>good (4)</td>
</tr>
<tr>
<td>80.00 - 100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

The percentage values include the student's performance at the FE as well as the bonus percentage they have obtained by taking the three mid-semester tests.

The following table shows the bonus percentage based on the average result of the semester tests. Absence counts as 0%.

<table>
<thead>
<tr>
<th>Average of the 3 tests (%)</th>
<th>Bonus (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.00 - 43.99</td>
<td>1</td>
</tr>
<tr>
<td>44.00 - 47.99</td>
<td>2</td>
</tr>
<tr>
<td>48.00 - 51.99</td>
<td>3</td>
</tr>
<tr>
<td>52.00 - 55.99</td>
<td>4</td>
</tr>
<tr>
<td>56.00 - 59.99</td>
<td>5</td>
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<tr>
<td>60.00 - 63.99</td>
<td>6</td>
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<tr>
<td>64.00 - 67.99</td>
<td>7</td>
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<td>68.00 - 71.99</td>
<td>8</td>
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<tr>
<td>72.00 - 75.99</td>
<td>9</td>
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<tr>
<td>76.00 - 79.99</td>
<td>10</td>
</tr>
<tr>
<td>80.00 - 83.99</td>
<td>11</td>
</tr>
<tr>
<td>84.00 - 100</td>
<td>12</td>
</tr>
</tbody>
</table>

Further bonuses can be given for the correct solution of one extra question in each midterm test. Maximum number of the bonuses in the second semester is 15. Bonuses are calculated only in the year of acquisition.

FE includes cell biology (Pharmaceutical Biology I.) and genetics & molecular biology (Pharmaceutical Biology II). Those students, who ask in advance to have their ESE mark in Pharmaceutical Biology I. to be considered as a part of their grade on the FE will be exempted from cell biology. They have to take examination only in genetics & molecular biology. However, this examination includes the following topics from the first semester: DNA, chromatin, chromosomes,
nucleus, cell cycle and cell division of eukaryotes and prokaryotes, since these are topics covered by genetics, as well. In this case the final grade of the FE is calculated as the average of the results of the ESE and the genetics exam taken at the end of the second semester. None of the grades can be fail (1) and in dubious cases the result of the genetics exam is accounted more.

The slides of the lectures and up-to-date information can be found at https://elearning.med.unideb.hu, username and password is your network-id (same as Neptun-id) and password. You will be able to check the content after the Neptun has registered you to the subject.

Departmental homepage: https://humangenetics.unideb.hu

Department of Inorganic and Analytical Chemistry

Subject: **INORGANIC AND QUALITATIVE ANALYTICAL CHEMISTRY PRACTICE**

Year, Semester: 1st year/2nd semester
Number of teaching hours:
Seminar: 14
Practical: 70

1st week:

**Seminar:**
1. Reaction of potassium chlorate with sulphur and red phosphorus (*demonstration*) (S.I. Practice 1).
2. Reaction of hydrogen sulfide with sulfur dioxide (*demonstration*) (S.I. Practice 1).
3. Preparation of solutions of ammonium sulfide and polysulfide, the decomposition of polysulfide (*demonstration*) (S.I. Practice 1).
4. Laboratory preparation of hydrogen with the use of Kipp-apparatus and combustion of hydrogen (*demonstration*) (S.I. Practice 1).

**Demonstrations taken from the lectures**
5. Reaction of melted potassium chlorate with gummy bear.
6. Detection and confirmation of SO and HS gases (SO + KIO, HS + Pb(NO) and PbS + HO).

**Practical:**
1. Inorganic and analytical laboratory rules (*exposition*).
2. Laboratory safety (*exposition*).
3. Distribution of laboratory equipment.
4. Reaction of potassium chlorate with sulphur and red phosphorus (*demonstration*) (S.I. Practice 1).
5. Reaction of hydrogen sulfide with sulfur dioxide (*demonstration*) (S.I. Practice 1).

2nd week:

**Seminar:**
1. Laboratory preparation of chlorine and its reaction with metals (*team study, the chlorine gas is taken form cylinder*) (S.I. Practice 2).
2. Preparation of chlorine by reacting NaClO (hypo) with HCl (*reading*) (S.I. Practice 2).
4. Reactions of hypochlorite ion (S.I. Practice 2).
5. Laboratory preparation of oxygen gas (*team study*) (S.I. Practice 2).
6. Combustion of elements in oxygen (*team study*) (S.I. Practice 2).

6. Preparation of solutions of ammonium sulfide and polysulfide, the decomposition of polysulfide (*demonstration*) (S.I. Practice 1).
7. Laboratory preparation of hydrogen with the use of Kipp-apparatus and combustion of hydrogen (*demonstration*) (S.I. Practice 1).

**Demonstrations taken from the lectures**
8. Reaction of melted potassium chlorate with gummy bear.
9. Detection and confirmation of SO and HS gases (SO + KIO, HS + Pb(NO) and PbS + HO)).
7. Reactions of hydrogen peroxide (S.I. Practice 2).
8. Chemical properties of sulfurous and sulfuric acid (S.I. Practice 2).

Demonstrations taken from the lectures
9. Preparation of peroxymonosulfuric (Caro’s) acid and its strong oxidizing properties

Practical: 1. Laboratory preparation of chlorine and its reaction with metals (team study, the chlorine gas is taken form cylinder) (S.I. Practice 2).
2. Preparation of chlorine by reacting NaClO (hypo) with HCl (reading) (S.I. Practice 2).
4. Reactions of hypochlorite ion (S.I. Practice 2).
5. Laboratory preparation of oxygen gas (team study) (S.I. Practice 2).
6 Combustion of elements in oxygen (team study) (S.I. Practice 2).
7. Reactions of hydrogen peroxide (S.I. Practice 2).
8. Chemical properties of sulfurous and sulfuric acid (S.I. Practice 2).

Demonstrations taken from the lectures
9. Preparation of peroxymonosulfuric (Caro’s) acid and its strong oxidizing properties

3rd week:
Seminar:
1. Laboratory preparation of nitrogen (S.I. Practice 3).
2. Chemical properties of ammonia, oxidation of NH3 by halogens (team study) (S.I. Practice 3).
3. Preparation and study of nitrogen monoxide (team study) (S.I. Practice 3).
4. Preparation and chemical properties of nitric acid and nitrates (S.I. Practice 3).
5. Experiments with phosphorus and with phosphorus pentoxide (S.I. Practice 3).

Demonstrations taken from the lectures
6. Preparation and properties of O (LB 16.6).
7. Ammonia fountain (LP).

4th week:
Seminar:
1. Properties of carbon dioxide (team study) (S.I. Practice 4).
2. Preparation and properties of carbon monoxide (reading) (S.I. Practice 4).
3. Experiments with boric acid and reactions of borate ion (S.I. Practice 4).
4. Reactions of alkali and alkaline earth metals with water (team study) (S.I. Practice 4).
5. Solution of alkali and alkaline earth metals in liquid ammonia (demonstration) (S.I. Practice 4).
6. Interaction of aluminium, lead and tin with acids and alkalies (S.I. Practice 4).
7. Interaction of iron, copper and zinc with acids and alkalies (S.I. Practice 4).

Demonstrations taken from the lectures
8. Cooling in the laboratory, cooling mixtures (solid CO – acetone cooling mixture).

2. Preparation and properties of carbon monoxide (reading) (S.I. Practice 4).
3. Experiments with boric acid and reactions of borate ion (S.I. Practice 4).
4. Reactions of alkali and alkaline earth metals with water (team study) (S.I. Practice 4).
5. Solution of alkali and alkaline earth metals in liquid ammonia (demonstration) (S.I. Practice 4).
6. Interaction of aluminium, lead and tin with acids and alkalies (S.I. Practice 4).
7. Interaction of iron, copper and zinc with acids and alkalies (S.I. Practice 4).

Demonstrations taken from the lectures
8. Cooling in the laboratory, cooling mixtures (solid CO – acetone cooling mixture).

5th week:
Seminar:
1. Practical classification of reactions and ions.
2. The reactions of anions.
3. The analysis of anion group I (carbonate, hydrogen carbonate, silicate, sulfide, polysulfide and sulfite ions).
4. Identification of halogenate ions.
5. Purity tests: Investigation of bromate impurity in potassium bromide.

Purity tests
6. Investigation of bromate impurity in potassium bromide.

Practical: 1. Practical classification of reactions and ions.
2. The reactions of anions.
3. The analysis of anion group I (carbonate, hydrogen carbonate, silicate, sulfide, polysulfide and sulfite ions).
4. Identification of halogenate ions.
5. Purity tests: Investigation of bromate impurity in potassium bromide.

6th week:
Seminar:
1. The analysis of anion group II (phosphate, sulfate, fluoride, bromate and iodate ions).
2. The analysis of anion group III (chloride, bromide and iodide ions).
3. Removal of orthophosphate ions from aqueous solutions (team study).
4. „Etching test” (demonstration).
5. Reactions of the members of IIrd anion group with [Fe(SCN)4]- (demonstration).

Unknown sample
6. Detection of an anion of group I-II in a solid salt of an alkali metal (CO32–; HCO3–; S2–; SO32–; SO42–; PO43– (HPO42–; H2PO4–); F–; BrO3–; IO3–).

Voluntary test
-The same as unknown sample, but solution is given.

Demonstrations taken from the lectures
7. Color of halogens and their aqueous solutions.
8. Color of the starch-iodine complex (the iodine test for starch).

Practical: 1. The analysis of anion group II (phosphate, sulfate, fluoride, bromate and iodate ions).
2. The analysis of anion group III (chloride, bromide and iodide ions).
3. Removal of orthophosphate ions from aqueous solutions (team study).
4. „Etching test” (demonstration).
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Voluntary test
-The same as unknown sample, but solution is given.

Demonstrations taken from the lectures
7. Color of halogens and their aqueous solutions.
8. Color of the starch-iodine complex (the iodine test for starch).

7th week:
Seminar:
1. Identification of bromide and iodide ions coexisting in solution with the use of chlorine water.
2. Identification of chloride ion in the presence of bromide or/and iodide (Berg’s reaction).

Unknown sample
3. Detection of two anions of group I-III in a solution of two alkali metal salts (CO32– S2–; SO32–; SO42–; PO43– (HPO42–; H2PO4–);
CHAPTER 16

F–; BrO3–; IO3–; Cl–; Br–; I–; SO32– and SO42– ions do not coexist).

Voluntary test
- Detection of one or two anions of group I–III in solution of two alkali metal salts (CO32–; S2–; SO32–; O42–; PO43– (HPO42–; H2PO4–); F–; BrO3–; IO3–; Cl–; Br–; I–; SO32– and SO42– ions do not coexist).

Practical: 1. Identification of bromide and iodide ions coexisting in solution with the use of chlorine water.
2. Identification of chloride ion in the presence of bromide or/and iodide (Berg’s reaction).

Unknown sample

Practical: 1. The analysis of anion group IV (nitrite, nitrate and chlorate ions).
2. Detection of nitrite and nitrate ions with Griess-Ilosvay reagent.

Unknown sample
3. Detection of two anions of group I–IV in a mixture of two alkali metal salts (CO32–; S2–; SO32–; O42–; PO43– (HPO42–; H2PO4–); F–; BrO3–; IO3–; Cl–; Br–; I–; NO2– and NO3–). The pairs of: SO32– – SO42–; Br– – NO3– and I– – NO3– are not given).

Voluntary test
4. The same as unknown sample, but solution is given.

Demonstrations taken from the lectures
5. Preparation of nitrous acid (cc. NOsolution + ice + HCl)
6. The brown ring test for nitrite ions
7. The
8. Reaction of chlorate ions with cc. HSO

9th week:
Seminar:
1. The reactions of cations
2. The analysis of cation group I and group IIA (Copper(II), silver(I), cadmium(II), mercury(I), mercury(II), lead(II) and bismuth(III) ions).

Purity test
3. Investigation of lead impurity in boric acid.
4. Investigation of silver impurity in “bismuth subnitrate, heavy”.

Practical: 1. The reactions of cations
2. The analysis of cation group I and group IIA (Copper(II), silver(I), cadmium(II), mercury(I), mercury(II), lead(II) and bismuth(III) ions).

Purity test
3. Investigation of lead impurity in boric acid.
4. Investigation of silver impurity in “bismuth subnitrate, heavy”.

10th week:
Seminar:
<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1. Sanger – Black’s test for trace analysis of arsenic impurity in solution (demonstration).&lt;br&gt;Purity test&lt;br&gt;2. Investigation of iron impurity in citric acid. &lt;br&gt;&lt;br&gt;Unknown sample&lt;br&gt;3. Detection of two cations of group I or IIA in a solution (Ag+, Cd2+, Cu2+, Hg22+, Hg2+, Pb2+, Bi(III) (Hg22+ – Hg2+ and Cu2+ – Hg22+ ions are not given together).&lt;br&gt;Voluntary test&lt;br&gt;- Detection of one or two cations of group I and IIA in solution (Hg22+ – Hg2+ and Cu2+ – Hg22+ ions are not given together).&lt;br&gt;Demonstrations taken from the lectures&lt;br&gt;4. The reactions of cations of cation group I and group IIA (Copper(II), silver(I), cadmium(II), mercury(I), mercury(II), lead(II) and bismuth(III) ions) with KI and KCrO.</td>
</tr>
<tr>
<td></td>
<td>Practical: 1. Sanger – Black’s test for trace analysis of arsenic impurity in solution (demonstration).&lt;br&gt;Purity test&lt;br&gt;2. Investigation of iron impurity in citric acid. &lt;br&gt;&lt;br&gt;Unknown sample&lt;br&gt;3. Detection of two cations of group I or IIA in a solution (Ag+, Cd2+, Cu2+, Hg22+, Hg2+, Pb2+, Bi(III) (Hg22+ – Hg2+ and Cu2+ – Hg22+ ions are not given together).&lt;br&gt;Voluntary test&lt;br&gt;- Detection of one or two cations of group I and IIA in solution (Hg22+ – Hg2+ and Cu2+ – Hg22+ ions are not given together).&lt;br&gt;Demonstrations taken from the lectures&lt;br&gt;4. The reactions of cations of cation group I and group IIA (Copper(II), silver(I), cadmium(II), mercury(I), mercury(II), lead(II) and bismuth(III) ions) with KI and KCrO.</td>
</tr>
</tbody>
</table>
| 11th | 4. Detection of two cations of group III in solution (the oxidation state of Fe and Cr can be +3, and the oxidation state of Mn can be +2 only).<br>Voluntary test<br>-Detection of one or two cations of group III in solution (the oxidation state of Fe and Cr can be +3, and the oxidation state of Mn can be +2 only).<br>Practical: 1. The analysis of cation group III (nickel(II), cobalt(II), iron(II), iron(III), manganese(II), chromium(III), zinc(II) and aluminium(III) ions).<br>2. Fluoride test” for aluminium (demonstration).<br>3. Detection of traces of nickel in cobalt salts.<br>4. Preparation and properties of cyanide complexes of some transition metal ions (S.I. Practice 11).<br>5. Use of organic reactions in analysis: determination of Fe2+ and Fe3+ions with 2,2’-dipyridyl reagent, determination of Ni2+ ions with dimethylglyoxime reagent and determination of Zn2+ ions with dithizone.(S.I. Practice 11).<br>Unknown sample<br>4. Detection of two cations of group III in solution (the oxidation state of Fe and Cr can be +3, and the oxidation state of Mn can be +2 only).<br>Voluntary test<br>-Detection of one or two cations of group III in solution (the oxidation state of Fe and Cr can be +3, and the oxidation state of Mn can be +2 only).<br>Practical: 1. The analysis of cation group III (nickel(II), cobalt(II), iron(II), iron(III), manganese(II), chromium(III), zinc(II) and aluminium(III) ions).<br>2. Fluoride test” for aluminium (demonstration).<br>3. Detection of traces of nickel in cobalt salts.<br>4. Preparation and properties of cyanide complexes of some transition metal ions (S.I. Practice 11).<br>5. Use of organic reactions in analysis: determination of Fe2+ and Fe3+ions with 2,2’-dipyridyl reagent, determination of Ni2+ ions with dimethylglyoxime reagent and determination of Zn2+ ions with dithizone.(S.I. Practice 11).<br>Unknown sample<br>4. Detection of two cations of group III in solution (the oxidation state of Fe and Cr can be +3, and the oxidation state of Mn can be +2 only).<br>Voluntary test<br>-Detection of one or two cations of group III in solution (the oxidation state of Fe and Cr can be +3, and the oxidation state of Mn can be +2 only).<br>
+3, and the oxidation state of Mn can be +2 only).

12th week:
Seminar:
1. The analysis of cation group IV (calcium(II), strontium(II) and barium(II) ions).
2. The analysis of cation group V (magnesium(II), lithium(I), sodium(I), potassium(I) and ammonium ions).
3. Reaction of Sr²⁺ and Ba²⁺ ions with sodium rhodizonate (S.I. Practice 12).
4. Salts of alkali metal ions with poor solubility in water (S.I. Practice 12).
5. Detection of traces of ammonia (demonstration).

Unknown sample
6. Detection of two cations of group I, IIA, III, IV or V in solution (One component is a cation of group I, IIA or III (Cu²⁺; Ag⁺; Cd²⁺; Hg₂²⁺; Hg²⁺; Pb²⁺; Bi(III); Ni²⁺; Co²⁺; Fe²⁺; Fe³⁺; Mn²⁺; Cr³⁺; Zn²⁺; Al³⁺) and the other one is a cation of group IV or V (Ca²⁺; Sr²⁺; Ba²⁺; Li⁺; Na⁺; K⁺; NH₄⁺). The oxidation state of Cr is +3, and the oxidation state of Mn is +2. Fe can be in oxidation state +2 or +3).

Voluntary test
- The same as the unknown sample (solution is given).

Demonstrations taken from the lectures

13th week:
Seminar:
1. Summary on group reactions.
2. Complete qualitative analysis of a solid sample.

Unknown sample
3. Complete qualitative analysis (cations, anions) of a solid mixture of two components. The cations or the anions in the two components are the same. This way the number of the detectable ions is 3.

The same cations can be in the sample which were investigated formerly (Cu²⁺; Ag⁺; Cd²⁺; Hg₂²⁺; Pb²⁺; Bi(III); Ni²⁺; Co²⁺; Fe³⁺; Mn²⁺; Cr³⁺; Zn²⁺; Al³⁺; Ca²⁺; Sr²⁺; Ba²⁺; Li⁺; Na⁺; K⁺; NH₄⁺), but Mg²⁺ is not given, and also two cations of group IV and of group V can not be together. The oxidation state of Hg, and Mn can be +2 only, oxidation state of Fe and Cr can be +3.

The possible anions are as follows: CO₃²⁻ (HCO₃⁻); SO₄²⁻; PO₄³⁻ (HPO₄²⁻, H₂PO₄⁻); F⁻; Cl⁻; Br⁻; I⁻; NO₃⁻ The various protonated forms of the anions cannot be identified.

Practical: 1. Summary on group reactions.
2. Complete qualitative analysis of a solid sample.

Unknown sample
3. Complete qualitative analysis (cations, anions) of a solid mixture of two components. The cations or the anions in the two components are the same. This way the number of the detectable ions is 3.

The same cations can be in the sample which were investigated formerly (Cu²⁺; Ag⁺; Cd²⁺; Hg₂²⁺; Hg²⁺; Pb²⁺; Bi(III); Ni²⁺; Co²⁺; Fe²⁺; Fe³⁺; Mn²⁺; Cr³⁺; Zn²⁺; Al³⁺) and the other one is a cation of group IV or V (Ca²⁺; Sr²⁺; Ba²⁺; Li⁺; Na⁺; K⁺; NH₄⁺). The oxidation state of Cr is +3, and the oxidation state of Mn is +2. Fe can be in oxidation state +2 or +3).

Voluntary test
- The same as the unknown sample (solution is given).

Demonstrations taken from the lectures
Hg\(^{2+}\); Pb\(^{2+}\); Bi\(^{3+}\); Ni\(^{2+}\); Fe\(^{3+}\); Mn\(^{2+}\); Cr\(^{3+}\); Zn\(^{2+}\); Al\(^{3+}\); Ca\(^{2+}\); Sr\(^{2+}\); Ba\(^{2+}\); Li\(^{+}\); Na\(^{+}\); K\(^{+}\); NH\(_{4}^{+}\), but Mg\(^{2+}\) is not given, and also two cations of group IV and of group V can not be together. The oxidation state of Hg, and Mn can be +2 only, oxidation state of Fe and Cr can be +3.

The possible anions are as follows: CO\(_{3}^{2−}\) (HCO\(_{3}^{−}\)); SO\(_{4}^{2−}\); PO\(_{4}^{3−}\) (HPO\(_{4}^{2−}\), H\(_{2}PO_{4}^{−}\)); F\(^{−}\); Cl\(^{−}\); Br\(^{−}\); I\(^{−}\); NO\(_{3}^{−}\). The various protonated forms of the anions cannot be identified.

4. Inventory and return of laboratory equipments.

Requirements

The laboratory course of 78 hours consists of seminars (1 class hours per week) and laboratory practices (5 hours per week). The course is given during 13 weeks. In the seminars the theoretical background of the laboratory investigations and some special or particular problems of analytical operations of the current experiments are discussed. The practices help students to get knowledge of material and to have training in the qualitative analytical laboratory operations and in compilation of laboratory reports.

Subject: INORGANIC AND QUALITATIVE ANALYTICAL CHEMISTRY THEORY
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Lecture: 42

1st week:
Lecture: Elements in the periodic table.

2nd week:

3rd week:

4th week:
Lecture: Carbon, silicon, germanium, tin and lead (Group 14). Atomic and physical properties, distribution, chemical properties of the elements. Chemistry of carbon and silicon. Typical compounds, the stereochemistry of carbon. Important compound of silicon. Oxides, oxoacids and related compounds. Carbon-nitrogen
compounds, carbides. Production and uses of the elements.

5th week:  
**Lecture:** Boron, aluminium, gallium, indium and thallium (Group 13). Atomic and physical properties, distribution, chemical properties of the elements. Structure and chemical properties of EX3 compounds. 3-centre bonding. Boron hydrides, binary and ternary hydrides of Al. Oxides and related compounds. Production and uses of the elements.

6th week:  

7th week:  
**Lecture:** Systematic analysis of cations. The Fresenius system. Reactions and separation of Group 1A and 1B cations: Ag(I), Pb(II), Hg(I), Cu(II), Hg(II), Bi(III), Cd(II). Reactions and separation of Group 2 cations (anions of semimetals): As(III), As(V), Sb(III) and Sb(V), Sn(II) and Sn(IV). Reactions and separation of Group 3 cations: Ni(II), Co(II), Fe(II), Fe(III), Mn(II), Cr(III), Al(III) and Zn(II). Reactions and separation of Group 4 cations: Ca(II), Sr(II) and Ba(II). Reactions of Group 5 cations: sodium -, potassium -, and lithium ions, Mg(II) and ammonium ions. Complete analysis of cations. Separation methods in the qualitative analysis.

8th week:  

9th week:  

10th week:  
**Lecture:** Titanium, Zirconium and Hafnium. Atomic and physical properties, distribution, chemical properties and uses of the elements. Halogenides and oxides. TiCl4, TiO2, ZrO2. Vanadium, Niobium and Tantalum. Atomic and physical properties, distribution, chemical properties and uses of the elements. Halogenides as cluster compounds. Oxides and related compounds. Chromium, Molybdenum and Tungsten. Atomic and physical properties, distribution, chemical properties and uses of the elements. Halogenides and oxides. Iso and heteropolyacids. Some Cr(III) compounds. Manganese, Technetium and Rhenium. Atomic and physical properties, distribution, chemical
properties and uses of the elements. Important compounds of manganese.

11th week:
Lecture: Iron, Cobalt and Nickel. Atomic and physical properties, distribution, chemical properties and uses of the elements. Production of iron and steel. Important inorganic and coordination compounds of the elements. Platinum metals (Ru, Rh, Pd, Os, Ir, Pt). Atomic and physical properties, distribution, chemical properties, production and uses of the elements. Important inorganic and coordination compounds of the elements. Copper, Silver and Gold. Atomic and physical properties, distribution, chemical properties and uses of the elements. Chemistry of photography. Zinc, Cadmium and Mercury. Atomic and physical properties, distribution, chemical properties, production and uses of the elements. Halogenides, oxides, sulphides and coordination compounds.

12th week:
Lecture: f-block elements. Electronic structure, the lanthanide contraction. Some important complexes of Gd. Important uranium compound related to the atomic energy industry.

13th week:

14th week:

Department of Organic Chemistry

Subject: ORGANIC CHEMISTRY PRACTICE I.
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Seminar: 14
Practical: 42

1st week:
Seminar: Receiving of laboratory equipments, safety education. Crystallization from water and organic solvent. Controlling of purity by thin-layer chromatography (TLC), and determination of melting point. Filling in of laboratory notes.
Practical: Receiving of laboratory equipments, safety education. • Crystallization. • Crystallization of acetanilide from water. (p. 62.) • Crystallization of benzanilide from methanol. (p. 62.) • Controlling of the purity by thin-layer chromatography (TLC), and determination of melting point. (p. 64.) • Filling of laboratory notes.

2nd week:
Seminar: Vacuum, simple and steam distillation. Isolation of nicotine from tobacco leaves.
Practical: • Distillation. • Vacuum and simple distillation of water. (p. 63.) • Steam distillation. • Isolation of nicotine from tobacco leaves. (p. 64.) • Filling of laboratory notes.

Self Control Test

3rd week:
Seminar: Isolation of caffeine from tea leaves.
CHAPTER 16

Separation of organic compounds with liquid-liquid extraction.

Practical: • Liquid-liquid extraction. • Isolation of caffeine from tea leaves. (p. 65.) • Separation of 1,3-dinitrobenze and 3-nitroaniline with liquid-liquid extraction. (p. 67.) • Filling of laboratory notes.

Self Control Test

4th week:

Seminar: Column chromatography.

Identification of hydrocarbons with test tube reactions.

Practical: • Separation of acetanilide and m-dinitrobenzene by column chromatography. (p. 73.) • Identification of hydrocarbons (test tube reactions). (p. 68.) Determination of unknown compound.

Self Control Test

5th week:

Seminar: Identification of organic halides with test tube reactions.


Self Control Test (Comprehensive written test)

Requirements

Conditions on signing the lecture book:

The laboratory work is evaluated by a five-level practical grade.

Prerequisite: General Chemistry Theory and Practice.

The Organic Chemistry Seminar and Laboratory Practice will be kept in three groups. Each group will exercise for 5 weeks.

Subject: ORGANIC CHEMISTRY THEORY I.

Year, Semester: 1st year/2nd semester

Number of teaching hours:

Lecture: 56

1st week:

Lecture: The definition and brief history of organic chemistry. Overview of the basic general chemical concepts needed for this subject. The basic nomenclature systems in organic chemistry: common or trivial names and systematic nomenclature. Basic rules to generate systematic names of organic compounds; substitutive and functional class nomenclature. The rules to generate the names the groups derived from hydrocarbons. The rules to generate the names of unbranched and branched (saturated and unsaturated) hydrocarbons. Description of functional groups in organic compounds. An overview of the most important organic compound groups based on their functional groups. The effect of functional groups on the electron structure of compounds.

2nd week:

Lecture: Classification and chemical bond of hydrocarbons. A brief summary of the theories of the chemical bond: the shared electron pair model, the valence bond model. Covalent and ionic bonds. The basics of LCAO-MO theories, types of atomic and molecular orbitals. Bi- and polycentric molecular orbitals, delocalization. VB theory, resonance structures and rules of
their writing. Hybridization.

3rd week:
**Lecture:** Electron shift phenomena, inductive and mesomeric effects, conjugation and hyperconjugation. Secondary bonds, intermolecular interactions, hydrogen bond, dipole-dipole, dipole-induced dipole interactions.

4th week:
**Lecture:** Characterization of the structures of alkanes and cycloalkanes. Review their conformational and physical properties. Basics of stereochemistry: characterization of constitutional, conformational and configurational isomers. Chirality, types of chiral molecules. The concept of enantiomers and diastereomers, general comparison of their chemical and physical properties. Absolute and relative configuration. Optical activity. The representation of organic molecules. The absolute configuration of chiral compounds, Fischer and Cahn-Ingold-Prelog convention. The role of chirality in drug chemistry.

5th week:
**Lecture:** Basics of the structure elucidation of organic compounds.

6th week:

7th week:
**Lecture:** Chemical properties of alkanes, radical substitution, chain reaction. Statistical and regioselective halogenation and interpretation based on radical stability in alkane halogenation. Sulphonation, sulphochlorination, nitration and oxidation of alkanes. The basic petrochemical processes (pyrolysis, cracking, isomerization) and their industrial significance. The most important natural sources and the synthetic methods of alkanes. Steroids

8th week:
**Lecture:** The characterization of the structure of alkenes, cycloalkenes, di- and polyenes. The hindered rotation: characterization of E / Z isomers. Synthesis of alkenes, cycloalkenes. Physical and chemical properties of alkenes and cycloalkenes. Electrophilic and radical addition reactions and practical significance. Interpretation of the regioselectivity of the addition reactions; the Markovnikov's rule.

9th week:
**Lecture:** Types of polymerization. Substitution in allylic position, interpretation of the stability of allylic intermediates. Oxidation of alkenes. Addition of conjugated dienes, partial and complete addition, 1,2 and 1,4 addition and its interpretation based on kinetic and thermodynamic control. Diels-Alder cycloaddition.

10th week:
**Lecture:** Characterization of the structure of alkynes and their physical properties. The stability and synthesis of alkynes. Chemical transformations of alkynes: C-H acidity, addition reactions and their significance. The role of acetylene in the chemical industry, coal-based chemical industry

11th week:
**Lecture:** The concept and the interpretation of aromaticity. Neutral and charged homo and heteroaromatic systems. The type and mechanism of the most important aromatic electrophilic substitution reactions (halogenation, nitrination, sulphonation, Friedel-Crafts acylation and alkylation). The SEAr reactions of substituted benzene derivatives – the reactivity and regioselectivity. Classification of substituents and interpretation of their effect on reactivity and regioselectivity.
12th week:

13th week:
Lecture: Classification of halogenated hydrocarbons, characterization of their structure and physical properties. The effect of the structure of the hydrocarbon skeleton, and the quality of the halogen on the strength of the C-Hlg bond and reactivity. Synthesis of halogenated hydrocarbons. Reactions of halogenated hydrocarbons. Interpretation of decreased, normal and high reactivity of halogenated hydrocarbons. Nucleophilic substitution and elimination of halogenated hydrocarbons. Interpretation of the mechanism of these reaction (SN1, SN2; α- and β-elimination; E1, E2 and E1cB).

14th week:
Lecture: Reaction of halogenated compounds with metals. The basics of chemistry of organometallic compounds. Their bonding system, the term "umpolung". Synthesis and reactivity of organometallic compounds. Organometallic compounds as nucleophiles and carbanion equivalents. C-C bond formation with organometallic reagents Grignard compounds and their application. Synthesis and interconversion of organometallic compounds, transmetallation.

Requirements
Lecture = terminal examination.

Department of Physical Chemistry

Subject: PHYSICAL CHEMISTRY I.
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Lecture: 28
Seminar: 28

1st week:
Lecture: General information.
Seminar: General information.

2nd week:
Lecture: Basic notions of thermodynamics.
Seminar: Basic notions of thermodynamics.

3rd week:
Lecture: First law of thermodynamics.
Seminar: First law of thermodynamics.

4th week:
Lecture: Second and third laws of thermodynamics.
Seminar: Second and third laws of thermodynamics.

5th week:
Lecture: Phase transitions.
Seminar: Phase transitions.

6th week:
Lecture: Mixtures.
Seminar: Mixtures.

7th week:
Lecture: Chemical equilibrium.
Seminar: Chemical equilibrium.
8th week:
Lecture: Transport processes.
Seminar: Transport processes.

9th week:
Lecture: Electrical conductance.
Seminar: Electrical conductance.

10th week:
Lecture: Galvanic cells.
Seminar: Galvanic cells.

11th week:
Lecture: Reaction kinetics - 1
Seminar: Reaction kinetics - 1

12th week:
Lecture: Reaction kinetics - 2
Seminar: Reaction kinetics - 2

13th week:
Lecture: Interfacial phenomena
Seminar: Interfacial phenomena

14th week:
Lecture: Colloids.
Seminar: Colloids.

Requirements
The seminars are compulsory. The semester is closed with written examination. The examination contains theoretical material as well as problems from those solved in the seminars. The prerequisite of the examination is the successful completion of the seminars.

Division of Biophysics

Subject: BIOPHYSICS
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Lecture: 14
Seminar: 13
Practical: 15

1st week:

2nd week:
Lecture: Fluorescence spectroscopy, fluorescence techniques.

3rd week:
Lecture: Lasers and their biomedical applications. Photodynamic therapy.
Practical: Introduction.

4th week:
Lecture: Optical and electron microscopy.

Practical: Practices are performed in subgroups of 4-5 students in a rotary system. For subgroup assignment, please see your lab teacher. P1: Determination of diffusion constant P2: Computed tomography Measurement of nuclear radiation P3: Determination of diffusion constant P4: Refractrometry P5: Light microscopy Optical measurements

5th week:
Lecture: Ionizing radiations and their interaction with materials. Dosimetry, tissue effects, detection of radiation.
CHAPTER 16


6th week:
Lecture: Medical imaging (CT, PET, SPECT, MRI)
Practical: Practices are performed in subgroups of 4-5 students in a rotary system.

7th week:
Practical: Practices are performed in subgroups of 4-5 students in a rotary system.

8th week:
Lecture: Diffusion at the molecular level, statistical interpretation. Fick's 1st law. Thermodiffusion. Osmosis
Practical: Practices are performed in subgroups of 4-5 students in a rotary system.

9th week:
Lecture: Structure of biological membranes. Membrane transport.
Practical: Practices are performed in subgroups of 4-5 students in a rotary system.

10th week:
Lecture: Origin of membrane potential Resting potential, action potential, electric excitable potential.§

11th week:
Practical: Practical exam

12th week:

13th week:
Lecture: Methods of pharmacological research. Gelectrophoresis, isoelectric focussing, blotting. Detecting molecular interactions (SPR, FCS, FRET)

14th week:
Lecture: Pharmacology of ion channels (gating, selectivity). Patch clamp technique.

Requirements

Compulsory reading:
- Lecture materials and description of lab practicals (published on the web page of the Department).

Condition for signing the lecture book:
• All labs done (if one missed only one repetition option is available)
• Lab exam attended (no make-up is available)
• Minimally 5 out of 6 biostatistics seminars attended (no make-up is available)
• Signing up for the electronic course PHARM-Biophys at the exam.unideb.hu website by the end of week 3 (the site can only be reached from inside the University network)
• Lecture attendance is strongly recommended

Practical requirements
In the laboratory practical, a laboratory logbook (into a booklet with stable pages) should be written with the aim of making the conditions of the measurements accomplished repeatable according to the notes. Students must be prepared to the lab. A part of this preparation is a brief summary of the theoretical part of the lab exercises to be performed. Each lab is graded from 1 to 5. The average score of 4 or 5 of all labs is rewarded with +1 exam point, which is added to the laboratory practical exam result. In case of unpreparedness, the lab exercise should be repeated, where maximum 2 points can be obtained for the makeup lab. An immediate organization of the makeup lab is the student’s responsibility by obtaining a written permission from the tutor at the end of the logbook.

Exams and grading:
• Lab exam (see the actual timetable) – 10+1 points max
• Final exam in biostatistics (see the actual timetable) – 20 points max
• Exemption test (electronic) in biophysics, or written exam (electronic) in final exam - 70 points max
Total: 100 points.

Grades:
• 50< pass (2)
• 60< satisfactory (3)
• 70< good (4)
• 80< excellent (5)
Please note that your lab and biostat work during the semester constitutes a compulsory part of your final score, which cannot be changed during the exam period, so take your studies seriously throughout the semester.

Repeaters
Those who have obtained a signature for the subject earlier are exempted from attending the labs and the biostatistics seminars.
Those exempted can chose to keep their scores from last year, or to take the exams together with the rest of the class during the semester. The decision has to be made before the end of the 3rd week of education, and the study advisor at biophysedu@med.unideb.hu notified about it. If you do not write, we automatically assume that you keep last year's score, and no changes to this will be possible. Biostatistics and Lab exemptions, scores, exams, etc. are independent from each other.
CHAPTER 17

ACADEMIC PROGRAM FOR THE 2ND YEAR

Department of Foreign Languages

Subject: HUNGARIAN LANGUAGE II/1.
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Practical: 28

1st week:
Practical: 1. fejezet : Emlékszik?

2nd week:
Practical: 1. fejezet: Emlékszik? / Tegezés - Önözés

3rd week:
Practical: 2. fejezet: Tegezés - Önözés

4th week:
Practical: 3. fejezet: Élelmiszerek 1.

5th week:

6th week:
Practical: 5. fejezet: Étkezések, étteremben 1.

7th week:

8th week:
Practical: 7. fejezet: Összefoglalás, midterm test

9th week:

10th week:

11th week:

12th week:

13th week:
Practical: 12. fejezet: Összefoglalás End term test

14th week:
Practical: Oral exam

Requirements

Requirements of the course:
Attendance
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6 occasions, (no matter why) the final signature will be refused and the student must repeat the course.
Absentees can make up the missed classes in the same week. with their own teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the coursebook to the class for the second time the attendance is refused.

Testing, evaluation

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In each Hungarian language course, students must sit for 2 written language tests, an oral and a listening exam. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test.

A further minimum requirement is the knowledge of 200 words per semester divided into 10 word quizzes. There are five word quizzes before and another five after the midterm test. If students fail or miss any word quizzes they cannot start their written test and have to take a vocabulary exam that includes all 100 words before the midterm and end term tests. A word quiz can be postponed by a week and students can take it only with their own teacher. Students can get bonus points (5-5%) by taking two extra quizzes containing 20 sentences each, before the midterm and end term tests. The sentences are taken from the units of the coursebook.

The oral exam consists of a role-play from a list of situations covered in the coursebook. If students fail the oral exam, they fail the whole course. The results of the written tests and the oral exam are combined and averaged.

Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-59</td>
<td>fail (1)</td>
</tr>
<tr>
<td>60-69</td>
<td>pass (2)</td>
</tr>
<tr>
<td>70-79</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>80-89</td>
<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score of the written tests is below 60, the student can take a written remedial exam once covering the whole semester’s material.

Coursebook: See the website of the Department of Foreign Languages: ilekt.med.unideb.hu.
Audio files to the course book, oral exam topics and vocabulary minimum lists are also available on the website.

Department of Inorganic and Analytical Chemistry

Subject: PHARMACEUTICAL BIOCHEMISTRY I.
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Lecture: 36
Practical: 4

1st week:
Lecture: Introduction to Biochemistry.
Primary, secondary, tertiary, quaternary structures.

2nd week:
Lecture: Determination of peptide structures.

3rd week:
Glycobiology.

4th week:
Lecture: Introduction to biological membranes.
Lipids. Classification and functions of lipids.
Neutral fats, oils and waxes. The major classes of membrane lipids. Membrane models.

5th week:

6th week:

7th week:

8th week:
Lecture: Citric acid cycle. Pyruvatedehydrogenase complex. The citric acid cycle is a source of biosynthetic precursors. Control of the citric acid cycle. The glyoxylate cycle.

9th week:

10th week:

11th week:

12th week:

13th week:

14th week:
Practical: Kinetic studies on beta-glucosidase from sweet almond.

Requirements
Detailed instructions will be given on the first lecture.

Subject: QUANTITATIVE ANALYTICAL CHEMISTRY I.
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Lecture: 42
Seminar: 14
ACADEMIC PROGRAM FOR THE 2ND YEAR

1st week:

2nd week:

3rd week:
Lecture: Acidimetric and alkalimetric titrations: titration curves and their calculations, factors influencing the shape of the titration curves, endpoint, equivalence point, methods of endpoint indication (Gran function and its applications). Applications of acid-base titrations.

4th week:
Lecture: Complex formation equilibria. Basic concepts: stepwise equilibrium, equilibrium constants, concentration distribution curves, simultaneous equilibria influencing complexometric reactions, conditional stability constant, chelate effect.

5th week:
Lecture: Complexometric titrations: titration curves and their calculations, factors influencing the shape of the titration curves, indication in complexometry, selective complex formation reactions. Applications of complexometric titrations.

6th week:
Lecture: Precipitation equilibria: Basic concepts: solubility, solubility product, factors influencing the solubility (the common ion effect, temperature effect, solvent effect, effects of simultaneous solution equilibria: protonation/hydrolysis or complex formation). Titration based on precipitate formation: titration curves and their calculations, shape of titration curves, endpoint indication. Practical applications (argentometry).
Seminar: Practice, consultation.

7th week:
Lecture: Equilibria of redox systems: Basic concepts: redox potential, Nernst equation, equilibrium redox potential, equilibrium constant and redox potential, factors influencing the redox potential. Redox titrations (oxidimetry, reductometry): titration curves and their calculations, shape of titration curves, practical applications (permanganometry, chromatometry, bromatometry, iodometry).
Seminar: Test I.

8th week:
Seminar: Complex formation equilibria. The concept and calculation of conditional stability constants. Calculations connected to complexometric titration methods.

9th week:
Lecture: Chromatographic methods: Basic concepts: classification, separation techniques, chromatographic process (HETP, number of theoretical plates, basic equation of chromatography, peak broadening, van Deemter equation, resolution and its optimization), characteristic values of a chromatogram (retention parameters, quantitative evaluation methods).
Seminar: Complex formation equilibria. The concept and calculation of conditional stability constants. Calculations connected to complexometric titration methods.

10th week:

11th week:
Lecture: Basic concepts: signal, noise, sensitivity, limit of detection, reproducibility, accuracy, precision, calibration, signal to noise ratio, basics of error calculation. Discarding questionable data points. Q-test, t-test. GLP, GMP.

12th week:

13th week:

14th week:
Seminar: Test II.
Requirements

Minimum requirements for seminar: The sum of scores from the two tests must be at least 41 points each out of 100 to pass, otherwise test III must be taken where at least 41 points should be scored. Only students with successful seminar result are eligible to register for the theoretical exam. During the theoretical exam the passing level is 40%. The grade for the subject is based on the final percentage value (C%) calculated from the seminar result (A%) and from the result of the theoretical exam (B%) as follows: $C\% = (A\% + 2 \times B\%)/3$.

Department of Organic Chemistry

Subject: ORGANIC CHEMISTRY PRACTICE II.
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Practical: 56

1st week:
Practical: Receiving of laboratory equipments. Safety educations. Repetition: crystallization from water, filtration, TLC, determination of melting point.

2nd week:
Practical: Repetition: distillation of acetone from KMnO4 and vacuum distillation of water. Separation of benzoic acid and benzanilide by liquid-liquid extraction.
Self Control Test (Short written test from the safety rules and laboratory equipments.)

3rd week:
Self Control Test (Short written test: purification and identification of solid compounds and distillation methods.)

4th week:
Practical: Preparation of benztriazole and 3-nitroaniline.
Self Control Test (Short written test test: chemistry of hydroxy derivatives of hydrocarbons: alcohols; phenols.)

5th week:
Practical: Identification of amino derivatives of hydrocarbons. Identification of unknown compounds
Self Control Test (Short written test: preparation and chemistry of diazonium salts.)

6th week:
Self Control Test (Short written test: Preparation and chemistry of amines.)

7th week:
Practical: Preparation of benzamide and benzoic acid.
Self Control Test (Short written test: Preparation and chemistry of aldehydes and ketones.)

8th week:
Practical: Synthesis and separation of 4-chlorobenzoic acid and 4-chlorobenzyl alcohol. TLC, determination of melting point.
Self Control Test (Short written test: Synthesis and chemistry of carboxylic acid derivatives.)
CHAPTER 17

9th week:
**Practical:** Preparation of 2,3-diphenyl-
quinoxaline and 2,6-dibenzylidene-
cyklohexanone. TLC, determination of melting point.

10th week:
**Practical:** Isolation and saponification of the glyceride of nutmeg. TLC, determination of melting point.

11th week:
**Practical:** Complex practical test: Identification of unknown compounds with test tube reactions.

12th week:
**Practical:** Preparation of O-Acetyl-salicylic acid
**Self Control Test (Final written test.)**

13th week:
**Practical:** Isolation of anethole from anise with steam distillation. Synthesis of p-anisic acid.

14th week:
**Practical:** Filling of laboratory notes. Cleaning of the laboratory glasswares. Deposit of the laboratory equipments. Assessment of laboratory practice.

**Requirements**

Compulsory literature: The hand-out provided by the leader of the laboratory practice.
Suggested Reading: The hand-out of the lecture of organic chemistry II as well as its compulsory and suggested literature.
Conditions on signing the lecture book: The laboratory work is evaluated by a five-level practical grade.

**Subject:** ORGANIC CHEMISTRY THEORY II.

Year, Semester: 2nd year/1st semester
Number of teaching hours:
Lecture: 56

1st week:
**Lecture:** Classification and characterization of hydroxyl derivatives of hydrocarbons (alcohols, phenols) and their thio analogues. Interpretation of their physical properties derived from their bonding system. The acid-base properties of alcohols, phenols and thio analogues. Preparation of alcohols, ethers, phenols and thio analogues.

2nd week:

3rd week:
**Lecture:** Overview of the organic compounds possessing C-N single bond. Classification of amines and characterization of their bonding systems. Interpretation of their physical derived from their bonding system. Synthesis of aliphatic and aromatic amines; industrial methods. Review and interpretation of basicity of amines. Chemical transformation of amines: alkylation, acylation of amino group. Synthesis of sulfonamide and reaction with nitric acid. Oxidation of the amines. SEAr reactions of anilines.
4th week:  

5th week:  

6th week:  

7th week:  

8th week:  

9th week:  

10th week:  

11th week:  
Lecture: Classification, structure and nomenclature of carbohydrates. Basic configuration and conformational conditions of monosaccharides. Most important chemical properties of monosaccharides: mutarotation, transformation of oxo group and hydroxyl groups, synthesis of glycosides. Most important representatives of di- and oligosaccharides (sucrose, maltose, cellobiose, lactose, cyclodextrins), factors determining their structure. Synthesis of di- and oligosaccharides, basic protecting groups and activation methods.

12th week:  
Lecture: Structure of heterocyclic compounds. Three-, four-, and five-membered heterocycles containing one heteroatom. β-lactam antibiotics. Porphyrins. Five-membered ring systems with two or more heteroatoms. Six-membered ring systems containing one heteroatom.

13th week:  
Lecture: Characterization and significance of six-membered heterocycles with multiple heteroatoms. The significance and types of
alkaloids, flavonoids and vitamins.

**14th week:**

**Lecture:** Classification and characterization of nucleic acids, their building blocks. Synthesis of nucleosides and nucleotides. Primary, secondary and tertiary structure and biological function of DNA and RNA. The genetic code. Information content of the nucleotide, amino acid and carbohydrate code and their correlation. Nucleotide coenzymes.

**Requirements**

Terminal examination, comprehensive examination.

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**Department of Physical Chemistry**

Subject: **COLLOID AND SURFACE CHEMISTRY PRACTICE**
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Lecture: 28
Practical: 28

**8th week:**

**Practical:** 1. Rheological characterization of concentrated emulsions (creams).

**9th week:**

**Practical:** 2. Measurement of surface tension of solutions by Du Nouy tensiometer.

**10th week:**

**Practical:** 3. Polymer's relative molecular masses from viscosity measurements.

**11th week:**

**Practical:** 4. Adsorption from solution.

**12th week:**

**Practical:** 5. Solubilization.

**13th week:**

**Practical:** 6. Determination of size distribution of a sedimenting suspension.

**14th week:**

**Practical:** 7. Experiments on thixotropic or other anomalous fluids with a rotation viscometer

**Requirements**

Attendance on all practice is compulsory. Preparation of lab notebooks is necessary to get the signature. More detailed instructions will be given on the first lab course.

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Subject: **COLLOID AND SURFACE CHEMISTRY THEORY**
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Lecture: 28

**1st week:**

**Lecture:** "A": A subject of colloid and surface chemistry. Classification of the dispersed systems. Type of colloids. Typical everyday colloids. Preparation of colloids. The basic characteristics of colloid systems: dispersity,
morphology, spatial distribution, interparticle interactions, normal distribution.
Thermodynamic and kinetic stability.
"B": Molecular interactions. Attraction forces: ion-ion, ion-dipole, dipole-dipole, dispersion interactions. Hydrogen bonds, hydrophobic interactions.

2nd week:
Lecture: "A": Definition of energy of activation.

3rd week:

4th week:

5th week:

6th week:

7th week:
CHAPTER 17

Requirements

Attendance on the lectures is highly recommended. The evaluation is based on the total score of a written test, 50% is necessary to pass. More detailed information will be presented on the first lecture.

Subject: PHYSICAL CHEMISTRY II.
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Practical: 28

1st week:
Practical: One of the following topics:
Measuring the concentration of a coloured solute by spectrophotometry or determination of thermodynamic quantities by calorimetry or electrochemistry.

2nd week:
Practical: One of the following topics:
Measuring densities by pycnometer, composition of a binary mixture or determination of partial molar volumes. Measuring electrical conductivity of solutions or dissociation constant of weak acids measured by conductometry.

3rd week:
Practical: One of the following topics:
Determination of NaHCO3 content of a solid sample by gas volumetry or distillation.

4th week:
Practical: One of the following topics: pH-metric titration curves of hydrochloric and acetic acids. Dissociation equilibria of ampholites, determination of isoelectric pH or study of electrolysis.

5th week:
Practical: One of the following topics: Kinetic measurements, mutarotation of glucose measured by polarimetry or kinetics of a second order reaction: hydrolysis of esters or initial rates and activation energy of the iodine clock.

6th week:
Practical: One of the following topics: Reaction rate of decomposition of H2O2 measured by gas volumetry. Investigation of buffers. Study of the iodine-iodide-triiodide equilibrium.

7th week:
Practical: One of the following topics: Redox potentials from potentiometric titrations. Determination of activity coefficient for concentration galvanic cell.

Requirements

The measurements and knowledge of the associated theory are graded and an overall mark will be given.

Safety training is mandatory before the first lab practice.

Everybody should work and do the measurement individually according to the pre-set schedule (it will be provided prior to the first lab). The laboratory practices are 4-hrs long. In accordance with the regulations of University of Debrecen, attendance is compulsory with the exception of health or family problems. In this case, the students should agree with the teacher on replacement dates for the missed experiments.
Department of Physiology

Subject: HUMAN PHYSIOLOGY I.
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Lecture: 28
Seminar: 14

1st week:
Lecture: Introduction
Passive and active transport
Resting membrane potential

2nd week:
Lecture: Ion channels
The mechanism of action potential
Basic receptor functions

3rd week:
Lecture: Cardiac action potential
ECG
Excitation-contraction coupling in cardiac muscle

4th week:
Lecture: Contractile properties of the heart
The cardiac output and the cardiac cycle
Effects of humoral agents and the autonomic nervous system on the heart

Self Control Test

5th week:
Lecture:
Physiology of synapse and neuromuscular junction
Skeletal muscle
Smooth muscle

6th week:
Lecture:
Physiology of the body fluids. Plasma.
Red blood cells. Blood types.
Jaundice. Hemostasis.

7th week:
Lecture:
Mechanics of respiration, Compliance, work of breathing
Gas transport in the blood
Central control of breathing

Self Control Test

8th week:
Lecture:
General properties of circulation, Arterial circulation
Microcirculation, venous circulation
Cardiovascular reflexes

9th week:
Lecture:
Humoral control of cardiovascular function
Nervous control of cardiovascular function
Circulation of special areas: Brain, Heart, Splanchnic area, skin and skeletal muscle

10th week:
Lecture: Cardiovascular Shock

13th week:
Self Control Test

Requirements

1. Signature of the Semester
Attendance of the lectures and seminars are compulsory. The signature of the semester may be refused if one has more than four absences from the seminars. Every student must attend seminars with the group appointed by the Educational Office. The program of the Human Physiology I
lectures is listed at the e-learning web site of the Department of Physiology. For continuous updates on all education-related matters, please check the elearning.med.unideb.hu web site (Department of Physiology menu item).

2. Evaluation during the semester (mid-semester tests)
The progress of students will be tested three times during the semester in the form of a written test (multiple choice questions). Participation on mid-semester written tests is compulsory.

3. Examination
The first semester is closed by an oral end-semester exam (ESE) covering the topics of all lectures and seminars. The list of oral exam questions is available on the elearning.med.unideb.hu web site (Department of Physiology menu item). Students may be exempted for ESE if the average score of the three mid-semester tests is higher than 60%, and (s)he has fewer than 4 - 4 lecture and seminar absences. If all these conditions are met, the offered mark will be calculated according to the following table:

<table>
<thead>
<tr>
<th>Score</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 – 69.9 %</td>
<td>pass (2)</td>
</tr>
<tr>
<td>70 – 79.9 %</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>80 – 89.9 %</td>
<td>good (4)</td>
</tr>
<tr>
<td>90 – 100 %</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

The student can refuse to accept the offered mark based on the results of mid-semester tests and choose to take ESE.

Division of Pharmacognosy

Subject: **BOTANY PRACTICE**
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Practical: 28

1st week:
**Practical:** Structure of plant cells, Diagnostic plant cell constituents, Inclusions, Vacuoles, Staining plant cells (Neutral Red, Lugol Solution etc.), Plasmolysis of plant cells, Preparation of your own microscopic samples.

2nd week:
**Practical:** Epidermis studies, Stomata, Primary and secondary epidermis, Digitalis purpureae folium, Salviae folium, Absinthi folium, Altheae folium, Thymi folium, Types of ti-chomes in Lamiaceae. Frangulae cortex, Analysis of Periderms and lenticels. Studying of Parenchymas and Collenchymas, Salep tuber, Calami Rhysoma, Marrubi herba, Capsici fructus, Cydonae fructus, Foeniculi fructus, Auranti pericarpium.

3rd week:
**Practical:** Studies on vascular tissues, Xylem - Tracheas, Tracheides, Xylemparenchymas, Fiber cells, Types of thickening, Phloem - Sieve cells, Sieve tubes, Sieve plates, Companion cells, Albuminous cells, Types of Vascular Bundles, Veratri radix, Agrimo-niae herba, Calami rhizoma, Belladonae folium, Filicis maris rhyzoma.

4th week:
**Practical:** Tissues of Primary and Secondary Roots, Veratri radix, Valerianae radix, Primulae
radix, Liquiritiae radix, Saponariae albae radix, Belladonae radix, Gentianae radix, Altheae radix.

5th week:
Practical: Tissues of Secondary roots, Ipecacuanhae radix, Ononis radix, Ratanhiae radix, Tissues of rhizomes, Graminis rhizoma, Veratri rhizoma, Rhei rhizoma.

6th week:
Practical: Tissues of Stems (Monocotyledonopsida, Dicotyledonopsida), Characterization of Cortex, Agrimoniae herba, Stem of Equisetum arvense, Chinae cortex, Frangula cortex, Cinnamoni cassiae Cinnamon ceylonici cortex, Quercus cortex.

7th week:
Practical: Tissues of leaves, Sennae folium, Absinthi folium, Uvae ursi folium, Belladonae folium, Stramonii folium, Hyoscyami folium, Calciumoxalate inclusions.

8th week:
Practical: Fruit studies, Foeniculi fructus, Carvi fructus, Anisi vulgaris fructus, ConiAuranti pericarpium, i fructus, Coriandri fructus, Juniperus galbulus, Fruits of Apiaceae.

9th week:
Practical: Seed studies, Tisseus of seeds, Lini semen, Strophanti semen, Sinapis nigrae semen, Strychni semen, Myristicae semen, Stereomicroscopic studies on seeds, Identifying characters of drugs.

10th week:
Practical: Characterization of Pharmaceutically important Families and Species of plants, Plant Identification, Dicotyledonopsida, Ranunculaceae, Helleboraceae, Papaveraceae, Fumariaceae.

11th week:
Practical: Characterization of Pharmaceutically important Families and Species of plants, Plant Identification, Rosaceae, Fabaceae, Apiaceae, Brassicaceae.

12th week:
Practical: Characterization of Pharmaceutically important Families and Species of plants, Plant Identification, Apocynaceae, Rubiaceae, Boraginaceae.

13th week:
Practical: Characterization of Pharmaceutically important Families and Species of plants, Plant Identification, Lamiaceae, Solanaceae, Scrophulariaceae, Asteraceae.

14th week:
Practical: Characterization of Pharmaceutically important Families and Species of plants, Plant Identification, Monocotyledonopsida, Liliaceae, Poaceae.

Requirements

Detailed information is given in the first practical course.

Subject: BOTANY THEORY
Year, Semester: 2nd year/1st semester
Number of teaching hours:
Lecture: 28

1st week:

Basic plant cell types, function of plant organelles.
2nd week:
Lecture: Anatomy of plant tissues, Meristems, Parenchymas, Collenchymas, Sclerenchymas, Epidermis (types of stomata), Vascular tissues, Ground tissues, Secretory tissues.

3rd week:
Lecture: Primary and Secondary plant body, Tissues of the Root and Stem, Xylem and Phloem, Function of Vascular Cambium. Organs Organizations of Root and Stem systems.

4th week:
Lecture: Primary and Secondary plant body, Tissues of Leaves and Reproductive Organs (anatomy of flowers), Organization of Leaves and Reproductive Organs, Plant Life Cycle, Gametophyte and Sporophyte, Sexual Reproduction of Plants, Double Fertilization and Pollination of Plants.

5th week:
Lecture: Inflorescens. Fruit Types (true and accessory fruits) and Seed Dispersal. Plant Embryo and Seed Anatomy, Development of Seeds, Types of Seedlings.

6th week:
Lecture: Classification and Systematic of Plants, Historical Aspects of Plant Classification, Artificial- versus Natural System of Classification, Levels of Taxonomic Categories, Phenic, Numeric- and Applied Taxonomy.

7th week:

8th week:
Lecture: Characterization of spermatophytes. Orders, families and important taxa of gymnosperms.

9th week:
Lecture: Taxonomy of Angiosperms. Orders, families and important taxa of Magnoliidae.

10th week:
Lecture: Dicotyledonopsida: Orders, families and important taxa of Hamamelididae and Dilleniidae.

11th week:
Lecture: Dicotyledonopsida: Orders, families and important taxa of Rosidae.

12th week:
Lecture: Dicotyledonopsida, Orders, families and important taxa of Asteridae.

13th week:
Lecture: Monocotyledonopsida: Orders, families and important taxa of Liliidae.

14th week:
Lecture: Monocotyledonopsida: Orders, families and important taxa of Commelinidae and Arecidae.

Requirements

Detailed information is given in the first lecture.
Department of Biochemistry and Molecular Biology

Subject: PHARMACEUTICAL BIOCHEMISTRY II.
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Lecture: 44
Practical: 5

1st week:

2nd week:

3rd week:

4th week:

5th week:

6th week:

7th week:
CHAPTER 17

the cell. Hsp 90 protein family and their role in the cell. Transcriptional regulation of heat shock genes. Stress signals.

Self Control Test

8th week:

9th week:

10th week:

11th week:
Lecture: Spring break

12th week:

13th week:
Self Control Test

14th week:
Practical: Enzymes of biotransformation.

Requirements

Requirements for signing the semester: attendance in laboratory practice. Attendance on the lectures is recommended, but not compulsory. Note that taking a successful exam is very difficult without the proper understanding of the lecture material, for which attendance on the lectures is essential.

There will be two written control tests during the semester, by which 2x50 points (max. 100 points) can be collected. Each control test consist of 20 test questions from the material of the lectures.

According to the result of the control tests, students can collect bonus points: those students who reaches at least 50 points will get 5 bonus points, those who reaches 70 points will get 10 bonus points. Bonus points will be added to the result of the final written exam. Control tests are not obligatory.

There is one practice in this semester, on the 14th week, it is obligatory for every student. Those students, who don’t attend the practice, can’t get signature for the semester. Practices are not obligatory for repeaters (if they have got signature previously).

The final „A”, „B” and „C” exams are written exams. On the exam 100 points can be collected by 40 test questions from the material of the Pharmaceutical Biochemistry lectures. Bonus points
collected by the control tests during the semester will be added to this result. 60 % (60 points) is needed to get a passing mark, and the grade increases with every 10 points: 60-67.5 pass; 70-77.5 satisfactory; 80-87.5 good; 90-110 excellent). If a student fails the written „C” exam, department provides him/her a chance to prove his/her knowledge in an oral exam, in front of an examination committee. There is no topic list for the oral questions, students can be asked from any part of the material of the lectures and of the lecture slides (lecture slides can be downloaded from the elearning.med.unideb.hu website of the department. If the student passes this oral exam, he/she will be given a grade 2 (pass). The department will provide one examination date per week during the exam period. Improvement exam: One improvement exam can be taken during the exam period. We always count the better grade of the taken exams. Please follow the announcements of the department on the announcement table (LSB downstairs, 1st corridor), and on the website (http://bmbi.med.unideb.hu).

Department of Foreign Languages

Subject: HUNGARIAN LANGUAGE II/2.
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Practical: 28

1st week:
Practical: Emlékszel?

2nd week:
Practical: Testrészek

3rd week:
Practical: Tünetek

4th week:
Practical: Gyógyszerek

5th week:
Practical: Klinikák és szakorvosok

6th week:
Practical: Lassítsunk egy kicsit!

7th week:
Practical: Összefoglalás, Midterm test

8th week:
Practical: Szoktál kanapészörfölni?

9th week:
Practical: Jó és rossz szokások

10th week:
Practical: Instrukció

11th week:
Practical: Tessék mondani!

12th week:
Practical: Anamnézis

13th week:
Practical: Összefoglalás End term test

14th week:
Practical: Oral exam

Requirements

Requirements of the course:
Attendance
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6
occasions, the final signature will be refused and the student must repeat the course.
Absentees can make up the missed classes in the same week with their own teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the coursebook to the class for the second time the attendance is refused.

Testing, evaluation
In each Hungarian language course, students must sit for 2 written language tests, an oral and a listening exam. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test.

A further minimum requirement is the knowledge of 200 words per semester divided into 10 word quizzes. There are five word quizzes before and another five after the midterm test. If students fail or miss any word quizzes they cannot start their written test and have to take a vocabulary exam that includes all 100 words before the midterm and end term tests. A word quiz can be postponed by a week and students can take it only with their own teacher. Students can get bonus points (5-5%) by taking two extra quizzes containing 20 sentences each, before the midterm and end term tests. The sentences are taken from the units of the coursebook.
The oral exam consists of a role-play from a list of situations covered in the coursebook. If students fail the oral exam, they fail the whole course. The results of the written tests and the oral exam are combined and averaged.
Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-59</td>
<td>fail (1)</td>
</tr>
<tr>
<td>60-69</td>
<td>pass (2)</td>
</tr>
<tr>
<td>70-79</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>80-89</td>
<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score of the written tests is below 60, the student can take a written remedial exam once covering the whole semester’s material.

Coursebook: See the website of the Department of Foreign Languages: ilekt.med.unideb.hu. Audio files to the course book, oral exam topics and vocabulary minimum lists are also available on the website.

Department of Inorganic and Analytical Chemistry

Subject: QUANTITATIVE ANALYTICAL CHEMISTRY PRACTICE II.
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Practical: 70

1st week:
Practical: Introduction to the Quantitative Analytical Chemistry Laboratory.
Laboratory Safety Information.
Review of lab equipment.
2nd week:
**Practical:** Preparation of ~0.1 M HCl titrant (250 ml).
Determination of the exact concentration of the HCl titrant solution using potassium hydrogen carbonate stock solution.
Determination of HgO in a HgO-KCl mixture (unknown sample).

3rd week:
**Practical:** Preparation of ~0.1 M NaOH titrant by the Sörensen (500 ml) and determination of its exact concentration.
Determination of oxalic acid (unknown sample).
Simultaneous determination of sulfuric acid and boric acid in a mixture (unknown sample).
Preparation of 0.02 M potassium permanganate titrant (250 ml).

4th week:
**Practical:** Preparation of 0.05 M sodium oxalate stock solution (100.00 ml).
Determination of the exact concentration of the potassium permanganate titrant solution using sodium oxalate stock solution.
Determination of ferrous oxalate by permanganometric titration (unknown sample).
Determination of hydrogen peroxide (unknown sample).

5th week:
**Practical:** Preparation of 0.02 M sodium thiosulfate titrant (250 ml) and determination of its exact concentration using 0.003 M potassium iodate stock solution.
Determination of copper(II) (unknown sample).
Determination of iodide ion (unknown sample).

6th week:
**Practical:** Preparation of 0.02 M potassium bromate titrant (250.00 ml).
Determination of ascorbic acid active ingredient content of vitamin C tablet (unknown sample).
Determination of the composition of KCl-KBr mixture using 0.05 M silver nitrate stock solution (unknown sample).

7th week:
**Practical:** Preparation of 0.01 M Na2EDTA titrant solution (250.00 ml).
Simultaneous determination of calcium(II) and magnesium(II) ions (unknown sample).
Determination of Al(III) (unknown sample).
Lab equipment return.

8th week:
**Practical:** Thin layer chromatography

9th week:
**Practical:** Conductometry

10th week:
**Practical:** Atomic spectroscopy

11th week:
**Practical:** pH-metry

12th week:
**Practical:** Gelelectrophoresis

13th week:
**Practical:** Size exclusion chromatography

14th week:
**Practical:** UV-VIS spectrophotometry

### Requirements

The course is scheduled for semester 4. The laboratory practice consists of two separate parts: classical quantitative analysis and instrumental analysis. The classical quantitative analysis part involved acid-base, redox, argentometric and complexometric titrations as well as two gravimetric procedures. The instrumental analysis part will introduce the student to the practice of atomic and
molecular spectroscopy, and different electrochemical methods. Attendence is compulsory at all of the sessions of the laboratory practice. All practice sessions involved short oral or written tests in order to make sure that student come to the lab fully prepared.

Grading is based on three separate factors:
- the average grade of short test written at the beginning of the classical quantitative analysis lab sessions (an average grade of them at least 2.0 is necessary to avoid a "fail" grade),
- the average grade of unknown samples at the classical quantitative analysis lab sessions (an average of them at least 2.0 is necessary to avoid a "fail" final grade),
- the average grade of instrumental analysis lab sessions (an average of them at least 2.0 is necessary to avoid a "fail" final grade).

Subject: **QUANTITATIVE ANALYTICAL CHEMISTRY THEORY II.**
Year, Semester: 2nd year/2nd semester
Number of teaching hours: Lecture: **14**

**Requirements**

Exams: oral

*In the oral exam two topics are randomly selected, one from the first () and the other from the second () part of the list. During preparation one topic (of your choice) needs to be written in detail while the other will be the subject of an oral exam. The final mark will be determined by the results of the two topics.*

**Subject closing topic list for pharmacy students**

1. Inorganic chemical considerations for the classification of Group I cations. Separation scheme for Group IA and B cations, chemical equations of reactions for the separation and identification of individual cations in this group.
2. Inorganic chemical considerations for the classification of Group II cations. Separation scheme for Group II cations, chemical equations of reactions for the separation and identification of individual cations in this group.
3. Inorganic chemical considerations for the classification of Group III cations. Separation scheme for Group III cations, chemical equations of reactions for the separation and identification of individual cations in this group.
4. Inorganic chemical considerations for the classification of Group IV cations. Separation scheme for Group IV cations, chemical equations of reactions for the separation and identification of individual cations in this group. Chemical equations of reactions for the identification of individual cations in Group V.
10. Complex formation equilibria, apparent stability constants.
11. Precipitation equilibria. Factors influencing the solubility of precipitates.
12. Redox equilibria and redox titration curves.
13. Titration curves and their significant points: equivalent volume, end point, titration errors.
   Chemical end point detection in titrimetric analysis. Chemical requirements for reagents and
   standard solutions in titrimetric analysis.
14. Practice of acid-base titrations, possibilities of application.
15. Theoretical background and practice of complexometric titrations. The chelate effect.
17. Bromatometry and iodometry.
18. Analytical applications of precipitation reactions. Argentometric titration curves. Practice of
   argentometry.
19. Gravimetry (theoretical background, practical steps, examples).
20. Background of separation methods based on extraction. pH dependence of solute partitioning
   processes. Determination of metal ions by extraction. Distillation.
21. Theoretical basis of the formation of molecular and atomic spectra. Main application fields of
   the spectroscopic methods.
22. Construction of the UV-Vis spectrometers (constructions, main parts, principles).
23. The practice of UV-Vis spectroscopy (analytical procedures, application areas, basic law).
24. Theoretical basis of atomic spectroscopy. Main methods and applications of atomic
   spectroscopy.
25. Potentiometry and its application in analytical chemistry.
27. Theoretical basis of chromatography (types, principles, instrumentation (injection, separation,
   detection), band spreading, separation efficiency, evaluation of chromatograms).

Department of Pharmaceutical Technology

Subject: PHARMACEUTICAL TECHNOLOGY THEORY I.
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Lecture: 28

1st week:
Lecture: Pharmaceutical Technology and the task of Pharmaceutical technology.
Definition of drug and dosing. Prescription. The connection between biopharmacy and
pharmaceutical technology. Basic principles of pharmacokinetics. The connection between
pharmaceutical preparation and drug effect.

2nd week:
Lecture: Pharmaceutical Pharmacopoeas.
Formulae Normales. Rules and regulations in

3rd week:
Other methods for separation
(sedimentation, centrifugation, expression,
drying, filtration.)

4th week:
Lecture: Filtration. Theoretical bases of
filtration. Types of instruments for filtration.
CHAPTER 17


7th week: Lecture: Emulsions. Macro and microemulsions.


13th week: Lecture: Colloid systems. Molecular colloids, association colloids, (termotrop and liotrop association colloids), Mucilages, enemas.

14th week: Lecture: Consultation.

Requirements

Students have to attend 30% of the lectures.

Requirements for signing the Lecture book: The Department may refuse to sign the subject if the student didn’t attend 30% of lectures according to attendance list.

At the end of semester students have oral exam. The prerequisite of oral exam is a written test before exam. If student doesn’t write more then 60% and fail the written test, it is prohibited to take an oral exam and get a fail (1) mark.

Subject: PHARMACEUTICAL TECHNOLOGY PRACTICE I,(PRESCRIPTION WRITING 1.)

Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Practical: 56

1st week: Practical: Weighing of Paraffinum liquidum, and distilled water.

To learn: Latin declension, numbers.


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2nd week:
Practical:
Technical books of pharmacy (European Pharmacopoiea, Formulae Normales, Hungarian Pharmacopoeia)
The prescription, nomenclature.
Simple calculations (w/w %).
Solutions, auxiliary materials.
Weighing of Paraffinum liquidum, and distilled water.

3rd week:
Practical:
The latin form of prescriptions.
Simple and composite solutions for internal and external use.
Solutio contra rhagades mamillae FoNo VII. 34,0g

4th week:
Practical:
Enemas and solutions for internal use.
Dose calculation.
Solutio papaverini 50,0g (magistral prescription)
Klysma chlorali pro infante FoNo VII 80,0g

5th week:
Practical:
Nasal and ear drops. Mixture.
Mixtura pectoralis FoNo VII. 100,0g
Nasogutta zinci c. ephedrino FoNo VI. 10,0g

6th week:
Practical: Test I.

7th week:
Practical: Gargle and suspensions.
Gargarisma antiseptica FoNo VII.

8th week:
Practical: Suspensions.
Suspensio terpini FoNo VII. 100,0g
Solutio theophyllini FoNo VII. 100,0g

9th week:
Practical: Peroral drops and their dose calculation.
Gutta aethylmorphini FoNo VII 10,0g
Suspensio anaesthetica FoNo VI 100,0g

10th week:
Practical: Decoctions and infusions.
Gutta expectorans composita FoNo VII.
Infusum ipecacuanhiae pro parvulo FoNo VI 100,0g

11th week:
Practical: Test 2.

12th week:
Practical: Emulsions.
Emulsio olei ricini FoNo VII. 100,0 g
Glycerinum boraxatum FoNo VII. 20,0g

13th week:
Practical:
Preparations of special emulsions (liniment).
Solutio noraminophenazoni pro parvulo FoNo VII. 100,0g
Linimentum scabicidum FoNo VI 100,0g

14th week:
Practical: Supplemental practice.
Consultation. Correction.

Requirements
You have to attend every practical in Pharmaceutical Technology. If you are not able to go to practice, you have to bring us certification by a doctor. However, 1-2 occasions if you have very important activity, please foretell it us, and we will let you know the makeup of practice. These occasions will be valid exception the tests.
You have to get ready for practical. We will give you guidelines of practical and we will discuss them. You have to study them at home. You have to write protocol about the practical according to our discussion and practical notes, so you have to bring with you a note book and you have to write...
the medicines in prescription form. We will measure back your preparations after the practice. At least 5 preparations will be measured back. If the grade of the measuring is failed, you must prepare it once more, but the average of the marks has to be at least satisfactory (3).

You will write short tests in most practices and 2 summery tests. This short test will contain measurement conversions, latin words and phrases, definitions etc. The summery tests will contain the knowledge of Pharmaceutical Technology practice. If you fail your summery test, you have got only one more chance to improve your test. In case of improvement the summery test mark will be the average of the first and the improved test. The mark of each summery test has to be a pass (2) or more then more pass (2) mark. If one or two summary test mark is a fail (1) mark at the end of semester, the practical grade will be a fail (1) mark as well.

During the semester the students will have one or more individual drug preparation as well. The average mark shouldn’t be fail (1) mark for individual drug preparation, or the teacher may refuse the signing of practice.

During the practice if the teacher recognizes any mistake that occurs because the student is not well prepared, the student may get a fail (1) mark for that practice. Besides, the teacher may give mark form 1-5 after every practice according to the student’s individual practice work, expenditure of preparation, clean and order of workplace, proper use of equipment, and proper behaviour.

This final grade will be the average of 2 summery tests, grade of short tests from prescription pharmacy lab, the grade of measuring back, grade of individual drug preparation and all other marks.

At the end of the semester you will get 5-stage practical grade.

Department of Physiology

Subject: **HUMAN PHYSIOLOGY II.**
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Lecture: 28
Seminar: 9

| 1st week: | \[\text{Lecture}: \text{Introduction, preparation for laboratory practice}
| Neural and hormonal control of the GI tract
| Motor functions of the gastrointestinal tract |
| 2nd week: | \[\text{Lecture}: \text{Secretion of saliva and gastric juice}
| Exocrine functions of the pancreas and liver
| Absorption of nutrients |
| 3rd week: | \[\text{Lecture}: \text{Nutrients and vitamins}
| Regulation of food intake and energy balance |
| 4th week: | \[\text{Lecture}: \text{Regulation of body temperature}
<p>| 5th week: | [\text{Lecture}: \text{Urinary concentration and dilution, clinical correlates} |</p>
<table>
<thead>
<tr>
<th>6th week:</th>
<th>8th week:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture:</strong></td>
<td><strong>Lecture:</strong></td>
</tr>
<tr>
<td>Osmoregulation, water balance, diuretics</td>
<td>The thyroid gland I.</td>
</tr>
<tr>
<td>Defense of body fluid volume, sodium balance</td>
<td>Male, Female gonadal functions</td>
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<tr>
<td></td>
<td>Pregnancy, lactation</td>
</tr>
<tr>
<td>6th week:</td>
<td>8th week:</td>
</tr>
<tr>
<td><strong>Lecture:</strong></td>
<td><strong>Lecture:</strong></td>
</tr>
<tr>
<td>Acid-base balance and acid-base disturbances</td>
<td>The hormones of adrenal cortex I.</td>
</tr>
<tr>
<td>Potassium balance, mycturition</td>
<td>The hormones of adrenal cortex II.</td>
</tr>
<tr>
<td>General principles of endocrinology</td>
<td>The hormones of pancreatic islets</td>
</tr>
</tbody>
</table>

**Self Control Test**

<table>
<thead>
<tr>
<th>7th week:</th>
<th>9th week:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture:</strong></td>
<td><strong>Lecture:</strong></td>
</tr>
<tr>
<td>Hypophysis, growth hormone</td>
<td>The hormones of adrenal medulla, catecholamines</td>
</tr>
<tr>
<td>Calcium balance, physiology of bone</td>
<td></td>
</tr>
<tr>
<td>The hormones of adrenal medulla, catecholamines</td>
<td></td>
</tr>
</tbody>
</table>

**10th week:**

**Lecture:** Endocrine regulation of intermediary metabolism

**Self Control Test**

**Requirements**

1. Signature of the semester
   Attendance of lectures and seminars is compulsory. The signature of the semester may be refused in case of more than four absences from the seminars. The completion of a missed seminar with a different group is not possible. Student must attend seminars with the group appointed by the Educational Office. For continuous updates on all education-related matters, please check the elearning.med.unideb.hu web site (Department of Physiology menu item).

2. Evaluation during the semester (mid-semester tests)

   The progress of students will be tested 3 times during the semester in the form of a written test (multiple choice questions). Students may earn bonus points that can be used to improve the score of the written part on the closing exam. The average score of the three mid-term tests is calculated and:
   a). If the average score is 80% or higher, the student is exempted from written part of the final exam, and only the oral part will be performed.
   b). If the average score is between 70% and 80%, 10 bonus points will be added to the result of the written part of the final examination.
   c). If the average score is between 60% and 70%, 5 bonus points will be awarded. If the number of absences of either the seminars or lectures exceeds four, the bonus points are lost.

3. Examination

   The second semester is closed by the final exam, which is composed of a written test and an oral section, covering the topics of all lectures, seminars and laboratory practices of the full academic year. The result of the exam is failed if the student fails either on the written part or on the oral part. The list of oral exam questions is available on the elearning.med.unideb.hu web site (Department of Physiology menu item).
**CHAPTER 17**

Subject: **HUMAN PHYSIOLOGY II. PRACTICAL**  
Year, Semester: 2nd year/2nd semester  
Number of teaching hours:  
Practical: **22**

<table>
<thead>
<tr>
<th>Week</th>
<th>Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st week</td>
<td>Orientation lecture</td>
</tr>
<tr>
<td>2nd week</td>
<td>INVESTIGATION OF THE CARDIOVASCULAR FUNCTIONS</td>
</tr>
<tr>
<td>3rd week</td>
<td>DETERMINATION OF PARAMETERS CHARACTERISING THE RESPIRATORY FUNCTIONS</td>
</tr>
<tr>
<td>4th week</td>
<td>EXAMINATION OF THE BLOOD</td>
</tr>
<tr>
<td>5th week</td>
<td>COMPUTER AIDED AQUISITION AND PROCESSING OF BIOLOGICAL SIGNALS</td>
</tr>
<tr>
<td>6th week</td>
<td>EFFECTS OF ELECTROLYTES ON THE UTERINAL SMOOTH MUSCLE</td>
</tr>
<tr>
<td>7th week</td>
<td>EFFECTS OF NEUROTRANSMITTERS AND HORMONES ON THE UTERINAL SMOOTH MUSCLE</td>
</tr>
<tr>
<td>8th week</td>
<td>COMPUTER SIMULATION OF THE FRANK-STRALING-MECHANISM</td>
</tr>
<tr>
<td>9th week</td>
<td>SIMULATION OF THE RENAL TRANSPORT MECHANISMS</td>
</tr>
<tr>
<td>10th week</td>
<td>Remedial lab</td>
</tr>
<tr>
<td>11th week</td>
<td>Exam</td>
</tr>
</tbody>
</table>

**Requirements**

1. Signature of the semester  
   Attendance of laboratory practices is compulsory. The signature of the semester may be refused in case of more than two absences from the practices. All missed practices must be made up. Completion of all topic sheets in the Exercise Book, each verified by the signature of the teacher, is also a precondition of the signature. Student must attend on Labs with the group appointed by the Educational Office.  
   For continuous updates on all education-related matters, please check the elearning.med.unideb.hu web site (Department of Physiology menu item).

2. Evaluation during the semester (mid-semester tests)  
   None

3. Examination  
   Laboratory practical knowledge of the students will be tested at the end of the second semester as part of the of the Lab Exam evaluation with five level grades.  
   As a precondition of attending the Lab Exam, the fully completed Exercise Book (with all the verified topics) must be presented. Students are expected to perform the given experiment on their
own and must be familiar with the theoretical background also. If the evaluation of the Lab Exam is ‘fail’ (1) then the Lab Exam can be repeated once during the exam period. There will be only one date for the improvement of the Lab Exam during the exam period.

Improvement of the successful Lab Exam grade is NOT possible during the regular examination period.

Division of Pharmacognosy

Subject: **PHARMACOGNOSY PRACTICE I.**
Year, Semester: 2nd year/2nd semester
Number of teaching hours: Practical: **56**

<table>
<thead>
<tr>
<th>1st week:</th>
<th>8th week:</th>
<th>9th week:</th>
<th>10th week:</th>
<th>11th week:</th>
<th>12th week:</th>
<th>13th week:</th>
<th>14th week:</th>
</tr>
</thead>
</table>

3rd week:
**Practical:** Carbohydrate-containing plant drugs I.

4th week:
**Practical:** Carbohydrate-containing plant drugs II.

5th week:
**Practical:** Fixed oils. Plant drugs containing organic acids and derivates.

6th week:
**Practical:** Essential oils I.: Plants containing monoterpene-based essential oils.

7th week:
**Practical:** Essential oils II.: Plants containing monoterpene-based essential oils II..

8th week:
**Practical:** Essential oils III.: Sesquiterpene and phenylpropanoid-based essential oils.

Requirements

Detailed information is given in the first practical course.
CHAPTER 17

Subject: PHARMACOGNOSY THEORY I.
Year, Semester: 2nd year/2nd semester
Number of teaching hours: Lecture: 28

1st week:
Lecture: The origins of pharmacognosy. The nomenclature of plant drugs; Sources of drugs, Production of drugs; Basic metabolic pathways, Origin of primary and secondary metabolites. The biosynthetic pathways.

2nd week:

3rd week:

4th week:

5th week:
Lecture: Carbohydrate containing drugs. Amylums, gums.

6th week:

7th week:

8th week:
Lecture: Monoterpenes and derivates: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

9th week:
Lecture: Oxydized monoterpenes: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

10th week:
Lecture: Sesquiterpenes and derivates: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

11th week:
Lecture: Diterpenes (resins and balsams), triterpene derivates: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy. Saponins.

12th week:
Lecture: Steroids and steroid saponins, furostanol and spirostanol derivates: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

13th week:
Lecture: Cardenolid glycosides and miscellaneous terpenoids: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

14th week:
Lecture: Consultation.  

Requirements

Detailed information is given in the first lecture.

Faculty of Pharmacy

Subject: PUBLIC PHARMACY PRACTICE AFTER 2ND YEAR (PERSONNEL AND OBJECTIVE REQUIREMENTS OF PHARMACY AND PREPARATION OF PHARMACEUTICAL DOSAGE FORMS)
Year, Semester: 2nd year/2nd semester
Number of teaching hours: 
Practical: 120

Requirements

Syllabus of summer practice for second year pharmacy students

Duration of practice:
4 weeks, 8 hours per day, from which 2 hours may be spent preparing. Second year students are required to gain proficiency in the following areas during their practice at a public pharmacy, and subsequently acquire knowledge about the conditions pertaining to personnel, equipment, supplies, operation, and workflow of a public pharmacy.

Requirements for the student: Accept and sign the non-disclosure agreement. Any absence from practice must be authentically justified based on the rules of the place of training. All absences must be made up. He/she is expected to follow the directions of the pharmacist in charge of the training.

Skills expected from the student after the completion of practice:
• practical application of theoretical knowledge obtained during his / her studies
• he / she is expected to know the premises and the assets of the public pharmacy and be able to obtain information from manuals and scientific journals used during his / her work
• he / she is expected to learn about the working activities of a public pharmacy
• he / she is required to have an appropriate work relationship with the co-workers in the pharmacy

Student tasks during the practice: Under the supervision of the pharmacist in charge of the training he / she will participate in the following activities:

1. Conditions pertaining to the personnel, equipment and supplies of the pharmacy:
• he / she is required to know the activities expected form the co-workers and the rules and regulations pertaining to them
• he / she is expected to know the rules of procedures
• he / she is expected to know the work protocol of the pharmacy
• he / she is required to be aware of rules and regulations pertaining to premises, equipment, supplies and assets
• he / she is expected to read pharmaceutical manuals and journals
• he / she is required to handle computer programs used in the pharmacy
• he / she is expected to become acquainted with authorities supervising work in pharmacies and representative bodies
2. Preparing medicine: Acquiring knowledge about simple pharmaceutical technologies (measurement, mixing powders, dilution, calculating solution concentration and doses, and other simple calculations performed in pharmaceutical practice) Learning magistral medicine preparation and its tools Preparation of liquid medication under supervision, appropriate packaging, knowledge of the usage Evaluation: Keeping an electronic notebook: description of 1 syllabus-related practical issue in half / one page every two weeks The pharmacist in charge of the training checks the work and description every second week and evaluates it using a five-point system. He /She sends the electronic notebook to the Dean’s Office according to the rules of the place of training. At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in a written form and grades the student based on a three-point system. He / she will send it to the Dean’s Office in a printed and signed form according to the rules of the training place. Student evaluation: After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training place.
CHAPTER 18

ACADEMIC PROGRAM FOR THE 3RD YEAR

Department of Anatomy, Histology and Embryology

Subject: PHARMACEUTICAL NEUROBIOLOGY
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Lecture: 38
Seminar: 14
Practical: 14

1st week:
Practical: Histology: The neural tissue.
Histology of the spinal cord. 1. Peripheral nerve (HE) 2. Spinal ganglion (HE) 3. Spinal cord (HE) 4. Spinal cord (Bielschowsky impregnation)

2nd week:
Lecture: 1. The structure of the spinal cord. 2. The structure of the brainstem and cerebellum. 3. The structure of the diencephalon and telencephalon
Practical: Histology: Histology of the cerebral and cerebellar cortex. 1 Cerebellum (HE) 2 Cerebrum (Golgi impregnation) 3 Cerebrum (Golgi impregnation)

3rd week:
Lecture: 1. Morphological basis of the neurotransmission. The chemical synapses. 2. Axonal transport. Degeneration and regeneration in the nervous system. 3. Consultation
Practical: Practice in Dissecting room: Gross anatomy of the spinal cord and the brain

4th week:
Seminar: Seminar

5th week:
Lecture: 1. Membrane properties of the neurones and glial cells. 2. Features and significance of the central excitatory and inhibitory synapses. 3. Somatomotor function of the spinal cord.
Seminar: Seminar

6th week:
Lecture: 1. The somatomotor system. 2. Vestibular apparatus. 3. Roles of spinal cord in the coordination of movements.
Seminar: Seminar

7th week:
Lecture: 1. Roles of brain stem and cerebellum in the coordination of movements.
Seminar: Seminar
Self Control Test (SELF CONTROL - THE DATE DEFINED LATER)

8th week:
Seminar: Seminar

9th week:
Practical: Histology: Functional microscopic anatomy of the skin 1 Fingertip skin (HE) 2 Scalp (HE)
CHAPTER 18

10th week:
Seminar: Seminar

11th week:
Lecture: 1. Anatomy of auditory and vestibular system. 2. Physiology of hearing. 3. The structure of the autonomic nervous system.
Practical: Histology: Microscopic anatomy of the eyeball and internal ear. 1 Eye (HE) 2. Inner ear (HE)

12th week:
Seminar: Seminar
Practical: Lab

13th week:
Lecture: 1. Sleep, wakefulness. 2. Learning, memory. 3. The monoaminergic and limbic system.
Seminar: Seminar
Practical: Lab

14th week:
Lecture: 1. Motivation, behaviour, emotions. 2. Consultation
Self Control Test (SELF CONTROL - THE DATE DEFINED LATER)

Requirements

The neurobiology course is an integrated one, delivered as a joint effort of three departments (Departments of Anatomy, Histology and Embryology and Physiology). In this academic year the Anatomy, Histology and Embryology Department is the course organizer. The educational activities of the Neurobiology course include lectures, seminars and practices. In the detailed program of the course (which, in fact, corresponds to the list of requirements) as well as here, both the compulsory and suggested textbooks are listed. Note, however, that the requirements of the course include material delivered in the lecture hall only, not necessarily available in the recommended textbooks, while in other cases some information in the suggested textbook is not regarded as part of the exam material.

Attendance of the seminars and practices is compulsory, although one may have two seminar and practice absences. If one collects three or more seminar and practice absences (regardless of the reason of the absences) the course organizer may refuse the end-semester signature.

During the term two self-control tests (SCTs) are organized. Attendance of the SCTs is compulsory. If one meets the passing conditions (see below), the end-semester examination may be substituted with the result achieved on the basis of these tests.

The first semester is closed by a written end-semester exam (ESE) covering the topics of all lectures, seminars and laboratory practices of the semester.

The ESE mark based on the average score of mid-semester tests will be offered if
- one’s average score of the three mid-semester tests is above 60%; and
- none of the individual tests' results are less than 50%.
- the signature of semester is NOT refused by the course coordinator.

The mark based on the average score of mid-semester tests is calculated according to the following table:
Score mark
0 – 59.9 %: fail
60 – 69.9 % pass
70 – 79.9 % satisfactory

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80 – 89.9 % good 
90 – 100 % excellent 

- If one is not satisfied with this result, (s)he may participate in ESE during the examination period.

Department of Foreign Languages

Subject: MEDICAL HUNGARIAN I. 
Year, Semester: 3rd year/1st semester
Number of teaching hours: 
Practical: 28

1st week: 
Practical: Introduction; Revision

2nd week: 
Practical: Body parts and internal organs

3rd week: 
Practical: Most common diseases

4th week: 
Practical: Types of medicine

5th week: 
Practical: Forms of medicine; Containers

6th week: 
Practical: How to take medicine?; Frequent side effects

7th week: 
Practical: Midterm test

8th week: 
Practical: Questioning the patient

9th week: 
Practical: Dialogues in the pharmacy 1.

10th week: 
Practical: Dialogues in the pharmacy 2.

11th week: 
Practical: Equipment in the pharmacy

12th week: 
Practical: Medicine kit

13th week: 
Practical: Revision

14th week: 
Practical: End term test; Oral exam

Requirements

Requirements of the course:
Attendance
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6 occasions, (no matter why) the final signature will be refused and the student must repeat the course.
Absentees can make up the missed classes in the same week with their own teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the
Testing, evaluation
In Medical Hungarian course, students have to sit for two written tests and an oral language exam. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test.
A further minimum requirement is the knowledge of 200 words per semester divided into 10 word quizzes. There are five word quizzes before and another five after the midterm test. If students fail or miss any word quizzes they cannot start their written test and have to take a vocabulary exam that includes all 100 words before the midterm and end term tests. A word quiz can be postponed by a week.
The oral exam consists of a role-play from a list of situations covered in the coursebook. If students fail the oral exam, they fail the whole course. The results of the written tests and the oral exam are combined and averaged.
Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-59</td>
<td>fail (1)</td>
</tr>
<tr>
<td>60-69</td>
<td>pass (2)</td>
</tr>
<tr>
<td>70-79</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>80-89</td>
<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score of the written tests is below 60, the student can take a written remedial exam once covering the whole semester’s material.

Coursebook: See the website of the Department of Foreign Languages: [ilekt.med.unideb.hu](http://ilekt.med.unideb.hu).
Audio files to the course book, oral exam topics and vocabulary minimum lists are also available on the website.

Department of Laboratory Medicine

Subject: CLINICAL BIOCHEMISTRY I.
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Lecture: 28
Practical: 14

1st week:
Lecture: 1. Introduction: pathobiochemistry, clinical chemistry, laboratory diagnostics
2. Different levels of laboratory diagnostics (reference values, requesting test, interpretation of results)

2nd week:
Lecture: 3. Laboratory aspects of investigating human disorders

3rd week:
Lecture: 4. Pathochemistry and laboratory signs of cell damage

4th week:
Lecture: 5. Pathobiochemistry of inflammation
6. Pathobiochemistry of plasma proteins

Lecture: 7. Clinical biochemistry of tumor
metastasis
8. Pathobiochemical alterations in association with tumor growth and metastasis formation and their laboratory detection I.

5th week:
Lecture: 9. Tumormarkers in the diagnosis of malignant diseases
10. Inherited metabolic diseases and their laboratory diagnostics I.

6th week:
Lecture: 11. Inherited metabolic diseases and their laboratory diagnostics II.
12. Inherited metabolic diseases and their laboratory diagnostics III.

7th week:
14. Laboratory diagnostics of hemoglobinopathies.
Practical: Molecular genetic methods in clinical biochemistry. Laboratory safety.

8th week:
Lecture: 15. Laboratory diagnostics of macrocytic and hemolytic anemias

9th week:
Lecture: 16. Laboratory diagnostics of quantitative platelet disorders.
17. Laboratory diagnostics of acut and chronic leukemias and lymphomas I.
Self Control Test

10th week:
Lecture: 18. Laboratory diagnostics of acut and chronic leukemias and lymphomas II.
19. Laboratory diagnostics of acut and chronic leukemias and lymphomas III.

11th week:
Lecture: 20. Blood group serology, biochemistry, inheritance, antigens and antibodies of ABO blood group system
21. Biochemistry, inheritance, antigens and antibodies of Rh blood group

12th week:
Lecture: 22. Other blood group system (Kell, Kidd, Duffy, MN, Ss, Ii). Regulation of transfusion
Practical: Determination of AB0 and Rh blood groups.

13th week:
Lecture: 24. Laboratory diagnostics of central nervous system diseases. Laboratory investigation of the cerebrospinal fluid.
25. Clinical biochemistry at the extremes of ages.
Practical: Detection of irregular antibodies, antibody screening, compatibility testing.

14th week:
Lecture: 26. Clinical biochemistry at the extremes of ages
27. Therapeutic drug monitoring I.-II.
Practical: Immunoassay.
Self Control Test

Requirements
Participation on practicals: Attendance of practicals is obligatory. Altogether one absence in the first semester and two absences in the second semester are permitted. In case of further absences,
the practicals should be made up for by attending the practicals with another group in the same week, or a medical certificate needs to be presented. Please note that strictly only a maximum of 3 students are allowed to join another group to make up for an absence.

Requirements for signing the Lecture book: The Department may refuse to sign the Lecture book if the student is absent from practicals more than allowed in a semester.

Assessment: During the first semester 2 written examinations are held, based on the material taught in the lectures and practicals. At the end of the first semester the written examinations are summarized and assessed by a five grade evaluation. If the student failed, he must write a test during the examination period. The C chance is an oral exam.

Requirements for examinations: The examination is based on the lecture and practical material (Practicals in Laboratory Medicine, eds.: János Kappelmayer and László Muszbek, 2016) as well as the relevant chapters from the textbook of William J. Marshall: Clinical Chemistry (8th edition, 2017).

Department of Pharmaceutical Chemistry

Subject: PHARMACEUTICAL CHEMISTRY PRACTICE I.
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Practical: 28

<table>
<thead>
<tr>
<th>1st week:</th>
<th>4th week:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Practical:</strong> Lab safety instructions, requirements.</td>
<td><strong>Practical:</strong> Analysis of alcohols, citric acid, urea.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd week:</th>
<th>5th week:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Practical:</strong> Analytical exercises of selected inorganic compounds according to the Pharmacopeia.</td>
<td><strong>Practical:</strong> Benzoic acid, resorcinol, thymol, methenamine.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd week:</th>
<th>6th week:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Practical:</strong> Analytical exercises of selected inorganic compounds according to the Pharmacopeia.</td>
<td><strong>Practical:</strong> Vitamines.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7th week:</th>
<th>7th week:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Practical:</strong></td>
<td><strong>Practical:</strong> Pain killers</td>
</tr>
</tbody>
</table>

Requirements

The laboratory practice is organized in groups, 7x4 hours. The presence of students at the practices is obligatory. If the student is absent from more than one practices, the semester will not be accepted (there is no possibility to arrange additional extra lab practices).

The semester of the student's lab practice will not be accepted in either of the following cases:
1. three unacceptable written tests/demos with the evaluation "Failed" (Mark "1"),
2. the student was not permitted to start the Lab Practice in two occasions*,
3. the student presented two unacceptable Lab Practice written tests/demos with the evaluation "Failed" (Mark "1"), and was not permitted to start the Lab Practice in one occasion*,
4. five demos or notebooks with the evaluation "Failed" (Marks "1" or "0") altogether in any combination.
5. the average of the marks is below 2.0
6. When the student can not present 4 successful Lab Practices in the semester.

*The student will not be permitted to start a Lab Practice in either of the following cases:
1. the student does not show up in the laboratory in 20 minutes from the scheduled starting date of the Practice,
2. the student can not present her/his lab practice notebook prepared according to the said requirements,
3. the student is unable to reach at least 5.0 points (55.5%) of the maximum score (9.0 points) related to the questions asked in connection with the topics of the Laboratory Practice!
4. When writing the test, cabs and other illegal sources are not allowed to use. If the student is found out in a cheating, the student must leave the Lab, and the Practice will be considered unsuccessful (Mark "0").

Subject: PHARMACEUTICAL CHEMISTRY THEORY I.
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Lecture: 42

1st week:
Practical: Short introductory practice.

2nd week:
Lecture: Pharmacologically important inorganic compounds.
Practical: Analytical exercises of selected inorganic compounds according to Pharmacopeia.

3rd week:
Lecture: General anesthetics: inhalation anesthetics, barbital and non-barbital-type narcotics. Anesthetics with pregnane skeleton. Sedatives and hypnotics: alcohols, aldehydes, urethanes, barbiturates and with 4-quinazolone, bezodiazepine and piperidine skeleton.

4th week:
Lecture: Antiepileptic agents (anticonvulsants):

compounds with barbiturate, hydantoin, oxazolidin-dione, succinimide and acylurea structure.
Practical: Aminophenazon derivatives, urethan, phenytoin.

5th week:
Practical: Selected aromatic compounds: resorcinol, thymol, acetylsalicylic acid etc.

6th week:
Practical: Phenothiazin derivatives; methenamine.

7th week:
Practical: Carbohydrates, ascorbic acid, citric
CHAPTER 18

Lecture: Psychopharmacones: anxiolytics (minor tranquilizers): carbamates, benzodiazepines, and diphenylmethane-type compounds. Another anxiolytics.

9th week:

10th week:
Lecture: Antiparkinson agents: piperidylphenyl propanols, diphenyl-methanes, phenothiazines, thioxanthenes.

11th week:

12th week:
Lecture: Central and peripheral antitussive agents. Expectorants. Bronchodilators. Medicines effective on the nasal and other mucosa, and on the respiratory system.

13th week:
Lecture: Central Muscle relaxants: ethers of glycerol and derivatives of 1,3-propanediol. Peripheral muscle relaxants: substances with membrane-stabilizing and depolarizing effects.

14th week:

Requirements

Lectures: Attendance to lectures is emphatically recommended. All material covered in lectures is an integral part of the subject and therefore included in the self-control tests and the final exam. Several new concepts and ideas are discussed in the lectures only and are not present in the textbook. Examination is possible only after a successfully finished laboratory practice.

Department of Pharmaceutical Technology

Subject: PHARMACEUTICAL TECHNOLOGY PRACTICE II. (INDUSTRIAL PRACTICE I.)
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Practical: 56

1st week:

2nd week:
Practical: Infusio natrii chlorati Ph.Hg.VII., Infusio salina Ph.Hg.VII.

3rd week:
Practical: Infusio glucosi Ph.Hg. VII.,Infusio manniti 100mg/m Ph.Hg.VII.
Requirements

You have to attend every practical in Industrial Practice during the 14 weeks. If you are not able to go to practice, you have to bring us certification by a doctor. But on 1-2 occasions if you have very important activity, please foretell it us, and we will discuss when we have any possibility to replace you them. These occasions will be valid exception the tests.

You have 5 weeks tableting, galenic and aseptic lab as well. At the 13th week, you write a big test from both parts (tableting, galenic, aseptic) and get individual mark for every part. The average of these three marks will be your practical mark. None of them can be a fail (1) mark. If you fail your test, you have got only one more chance to improve your test. If you get a fail mark for the improvement test, you have to write a test from both parts again and the mark of this test will be the final practical mark. In case you do not pass this test, you are not able to get the final signature from Industrial practice.

The final practical grade will be the average of tableting lab, galenic lab and aseptic lab marks but none of the marks can be fail (1).

If you want to improve your practical mark, you have to write an improvement test from both parts.

Subject: PHARMACEUTICAL TECHNOLOGY PRACTICE II. (PRESCRIPTION WRITING II.)
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Practical: 56
1st week:
**Practical:** Introduction, general information. Labour safety, laboratory regulation. Requirements.

2nd week:
**Practical:** Suppositories. Calibration of suppository moulds individually (1,2,3 g)
Determination of the calibration value:
1. Adeps solidus
2. Adeps solidus compositus
3. Massa macrogoli

3rd week:
**Practical:** Determination of displacement factors. Calculation of tota massa.
Suppositorium noraminophenazoni 100 mg FoNo VII.

4th week:
**Practical:** Preparation of suppositories and suspension type ointments
1. Suppositorium theophyllini 250 mg FoNo VII.
2. Unguentum antisepticum FoNo VII. (suspension ointment)

5th week:
**Practical:** Preparation of ointments.
1. Unguentum carbamidi FoNo VII. (dissolved ointment)
2. Suppositorium antispastica pro parvulo FoNo VI.

6th week:
**Practical:** Creams.
1. Unguentum boraxatum FoNo VII. (w/o ointment)
2. Cremer aquosus FoNo VII. (o/w ointment)
Consultation

7th week:
**Practical:** Test 1.

8th week:
**Practical:** Gels.
1. Unguentum salicylatum FoNo VII.
2. Anaesthetic gel (individ. comp.)
3. Suppositorium analgeticum forte FoNo VII.

9th week:
**Practical:** Pastes. Individual drug preparation 1st group
1. Pasta contra solarem FoNo VII.
2. Pasta zinci oxydati Ph.Hg.VII.
3. Suppositorium spasmodicumFoNo VII.

10th week:
**Practical:** Undivided powders. Individual drug preparation 2nd group
1. Pulvis antacidus FoNo VII.
2. Sal ad rehidrationem FoNo VII.
3. Unguentum neonatorum FoNo VII.

11th week:
**Practical:** Individual drug preparation 3rd group
1. Unguentum haemorrhoidale FoNo VII.
2. Suppositorium ad nodum FoNo VII.
3. Unguentum nutritivum FoNo VII.

12th week:
**Practical:** Individual drug preparation 4th group
Supplemental practice.

13th week:
**Practical:** Test 2.

14th week:
**Practical:** Consultation. Correction.

**Requirements**

You have to attend every practical in Pharmaceutical Technology. If you are not able to go to practice, you have to bring us certification by a doctor. However, 1-2 occasions if you have very important activity, please foretell it us, and we will let you know the makeup of practice. These
occasions will be valid exception the tests.
You have to get ready for practical. We will give you guidelines of practical and we will discuss
them. You have to study them at home. You have to write protocol about the practical according to
our discussion and practical notes, so you have to bring with you a note book and you have to write
the medicines in prescription form.
We will measure back your preparations after the practice. At least 5 preparations will be measured
back. If the grade of the measuring is failed, you must prepare it once more, but the average of the
marks has to be at least satisfactory (3).
You will write short tests in most practices and 2 summery tests. This short test will contain
measurement conversions, latin words and phrases, definitions etc. The summery tests will contain
the knowledge of Pharmaceutical Technology practice. If you fail your summery test, you have got
only one more chance to improve your test. In case of improvement the summery test mark will be
the average of the first and the improved test. The mark of each summery test has to be a pass (2) or
more then more pass (2) mark. If one or two summary test mark is a fail (1) mark at the end of
semester, the practical grade will be a fail (1) mark as well.
During the semester the students will have one or more individual drug preparation as well. The
average mark shouldn’t be fail (1) mark for individual drug preparation, or the teacher my refuse
the signing of practice.
During the practice if the teacher recognizes any mistake that occurs because the student is not well
prepared, the student may get a fail (1) mark for that practice. Besides, the teacher may give mark
form 1-5 after every practice according to the student’s individual practice work, expenditure of
preparation, clean and order of workplace, proper use of equipment, and proper behaviour.
This final grade will be the average of 2 summery tests, grade of short tests from prescription
pharmacy lab, the grade of measuring back, grade of individual drug preparation and all other
marks.
At the end of the semester you will get 5-stage practical grade.

Subject: PHARMACEUTICAL TECHNOLOGY THEORY II.
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Lecture: 28

1st week:
Methods of sterilization. Methods of physical sterilization. (heat sterilization, sterilization with
radiation, sterilization with ultrasound.)

2nd week:
Lecture: Aseptic formulation of drug. “Clear surface“. Microbiological purity of dosage
forms. Principles for aseptic formulation.
Disinfections. Preservation.

3rd week:
Lecture: Infusion systems. Basic principles.
Formulation of infusions.

4th week:
Lecture: Investigation of infusions. Special
infusion systems. Tanks (use of plastic tanks.).

5th week:
Lecture: Injections. Basic principles.
Definitions. Methods of administration.
Biopharmaceutical problems. Basic requirements
for the formulation of injections. Active agents
and ingredients of injectable systems. Solvents.
Formulation of injections.

6th week:
Lecture: Tanks for injections, filling and
closing. Sterilization. Examination of injections
and quality assurance. Stabilization of injections.
### CHAPTER 18

Special injectable solutions. (injectable suspensions, dry powder, tablets)

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th week</td>
<td>Ingredients of tableting and granulation. (Diluents, desintegration agents, binders, adsorption agents, moisture maintain agents, hydriphylizating agents, glidant, lubricant, antiadhesion agents, antistatic agents, dyes, colouring agents). Investigation of tablets and granules.</td>
</tr>
<tr>
<td>11th week</td>
<td>Formulation of suppository by cold compression and moulding. Special formulations for suppositories, investigation of suppositories. Suppository mold.</td>
</tr>
<tr>
<td>14th week</td>
<td>Consultation</td>
</tr>
</tbody>
</table>

#### Requirements

Students have to attend 30% of the lectures.
Requirements for signing the Lecture book: The Department may refuse to sign the subject if the student didn’t attend 30% of lectures according to attendance list.
At the end of semester students have oral exam. The prerequisite of oral exam is a written test before exam. If student doesn’t write more then 60% and fail the written test, it is prohibited to take an oral exam and get a fail (1) mark.

### Division of Pharmacognosy

Subject: **PHARMACOGNOSY PRACTICE II.**
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Practical: **56**

<table>
<thead>
<tr>
<th>Week</th>
<th>Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st week</td>
<td>Introduction. General discussion.</td>
</tr>
</tbody>
</table>
2nd week: 
Practical: Alkaloids I.

3rd week: 
Practical: Alkaloids II.

4th week: 
Practical: Alkaloids III.

5th week: 
Practical: Anthraquinone containing plant drugs.

6th week: 
Practical: Flavonolignane and dianthrone containing plant drugs.

7th week: 
Practical: Flavonoid containing plant drugs I.

8th week: 
Practical: Flavonoid containing plant drugs II.

9th week: 
Practical: Tannin containing plant drugs.

10th week: 
Practical: Coumarin containing plant drugs.

11th week: 
Practical: Plant drugs containing miscellaneous phenolic compounds.

12th week: 
Practical: Examination of herbal tea mixtures.

13th week: 
Practical: Practical exam: Recognition of plant drugs, identification and characterization of herbal tea mixtures.

14th week: 
Practical: Practical exam: Recognition of plant drugs, identification and characterization of herbal tea mixtures.

Requirements
Detailed information is given in the first practical course.

Subject: PHARMACOGNOSY THEORY II.
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Lecture: 28

1st week: 
Lecture: Alkaloids: history, distribution, properties. Lysine and ornithine derived alkaloids: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

2nd week: 
Lecture: Phenylalanine and tryptophane-derived alkaloids: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

3rd week: 
Lecture: Glycine and histidine derived alkaloids; other, special amino acid derivates, glucosinolates, isothiocyanates: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

4th week: 
Lecture: Phloroglucin-derivates, anthraquinone derivates: Biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

5th week:
CHAPTER 18

**Lecture:** Flavonoids: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

**6th week:**
**Lecture:** Flavonolignanes, lignanes: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

**7th week:**
**Lecture:** Coumarines, furano and pyranocoumarines: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

**8th week:**
**Lecture:** Tannins: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

**9th week:**
**Lecture:** Naphtoquinones, phenolic compounds, phenolic glycosides, phenypropanoids: biosynthetic origin, classification, chemistry, therapeutic applications in phytotherapy.

**10th week:**
**Lecture:** Phytotherapy in general. Evidence-based phytomedicine. Phytherapeutic products. Side-effects, contraindications and interactions of herbal medicine.

**11th week:**
**Lecture:** Antioxidants, plant anti-inflammatory agents. Phytotherapy of the cardiovascular and the central nervous system.

**12th week:**
**Lecture:** Phytotherapy of the gastrointestinal and the urogenital tracts.

**13th week:**
**Lecture:** Phytotherapy of the respiratory system. External applications. Chemoprevention.

**14th week:**
**Lecture:** Consultation.

**Requirements**

Detailed information is given in the first lecture.

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Institute of Behavioural Sciences, Faculty of Public Health

**Subject:** PHARMACEUTICAL PSYCHOLOGY

Year, Semester: 3rd year/2nd semester

Number of teaching hours:

**Lecture:** 28

**1st week:**
**Lecture:** Introduction. Nature of psychology: main fields, theories and methods. Biopsychosocial model

**2nd week:**
**Lecture:** Health behaviours: definition, demographic, determinants. Variables influencing health attitudes. Illness behaviours: definition, the experience of illness, patient role. Representations and benefits of illness. Illness cognitions.

**3rd week:**
**Lecture:** Communication with people with special needs and handicap.

**4th week:**
**Lecture:** Communication with elderly people.
5th week:

6th week:
Lecture: Stress, coping, psychological immune system.

7th week:
Lecture: Psychosomatics.

8th week:

9th week:
Lecture: Illness as crisis. Chronic: illness, hospitalisation.

10th week:
Lecture: The psychology of pain.

11th week:
Lecture: The placebo effect.

12th week:
Lecture: Change in health behaviour. Stages of change, the Prochaska-DiClemente model.

13th week:
Lecture: Written Exam

Requirements
Attendance in the lectures is required. Usable understanding of the core theoretical concepts and conceptions is required as well as the knowledge on the actual patients’ rights regulation.

Department of Foreign Languages

Subject: MEDICAL HUNGARIAN II.
Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Practical: 28

1st week:
Practical: Introduction; Revision

2nd week:
Practical: Grouping of medicine; Administration of medicine

3rd week:
Practical: Medical aids; Medical kit

4th week:
Practical: First aid kit

5th week:
Practical: Travel kit

6th week:
Practical: Important verbs

7th week:
Practical: Midterm test

8th week:
Practical: The digestive system and related medications

9th week:
Practical: The ideal laxative

10th week:
Practical: The respiratory system and related medications
11th week:  
**Practical:** The skin and skin preparations

12th week:  
**Practical:** The eye and eye preparations

13th week:  
**Practical:** Mini presentations

14th week:  
**Practical:** End term test; Oral exam

**Requirements**

**Requirements of the course:**

**Attendance**
Attending language classes is compulsory. If a student is late it is considered as an absence. Students can miss only 10 percent of the classes that is maximum 2 occasions. If they miss 6 occasions, (no matter why) the final signature will be refused and the student must repeat the course.

Absentees can make up the missed classes in the same week with their teacher in case they bring a certificate from the doctor to the class. The teacher evaluates active participation in each class. Students are not supposed to share coursebooks in the classes therefore if they fail to bring the coursebook to the class for the second time the attendance is refused.

**Testing, evaluation**
In Medical Hungarian course, students have to sit for a written mid-term and an oral final exam. Students must appear at the lecture hall at least 15 minutes before the exam. If students are late, they are not allowed to write the test.

A further minimum requirement is the knowledge of 200 words per semester divided into 10 word quizzes. There are five word quizzes before and another five after the midterm test. If students fail or miss any word quizzes they cannot start their written test and have to take a vocabulary exam that includes all 100 words before the midterm and end term tests.

The oral exam consists of a role-play from a list of situations covered in the coursebook. If students fail the oral exam, they fail the whole course. The results of the written tests and the oral exam are combined and averaged.

Based on the final score the grades are given as follows.

<table>
<thead>
<tr>
<th>Final score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-59</td>
<td>fail (1)</td>
</tr>
<tr>
<td>60-69</td>
<td>pass (2)</td>
</tr>
<tr>
<td>70-79</td>
<td>satisfactory (3)</td>
</tr>
<tr>
<td>80-89</td>
<td>good (4)</td>
</tr>
<tr>
<td>90-100</td>
<td>excellent (5)</td>
</tr>
</tbody>
</table>

If the final score of the written tests is below 60, the student can take a written remedial exam once covering the whole semester’s material.

**Coursebook:**
See the website of the Department of Foreign Languages: [ilekt.med.unideb.hu](http://ilekt.med.unideb.hu).

Audio files to the course book, oral exam topics and vocabulary minimum lists are also available on the website.
Department of Immunology

Subject: IMMUNOLOGY
Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Lecture: 28
Seminar: 6
Practical: 14

1st week:
Lecture: Elements of the immune system. The structure of lymphoid tissues, primary and secondary lymphoid organs.

2nd week:
Lecture: Component and cells of the innate response. Characteristics and function of the innate immune response.
Seminar: Characteristics and function of the innate immune response. Components and cells of the innate response.

3rd week:
Lecture: T-lymphocytes. Antigen presentation, T cell types.
Seminar: T-lymphocytes. Antigen presentation, T cell types.

4th week:
Lecture: Structure of MHC, MHC polymorphism.
Seminar: The polymorphism of MHC molecules, structure and function of proteins encoded by the major histocompatibility (MHC) gene complex.

5th week:
Lecture: B-lymphocytes. An introduction to antibody structure and function.
Practical: B-lymphocytes. An introduction to antibody structure and function.

6th week:
Lecture: Inflammation and the acute phase response. Mucosal immune system.
Practical: Inflammation and the acute phase response. Mucosal immune system.

7th week:

8th week:
Lecture: Activation and antigen-dependent differentiation of B-lymphocytes.
Practical: Activation and antigen-dependent differentiation of B-lymphocytes.
Self Control Test

9th week:
Lecture: The development of immunological memory. Active and passive immunization. Peripheral mechanisms of immune tolerance.
Practical: The development of immunological memory. Active and passive immunization. Peripheral mechanisms of immune tolerance.

10th week:
Lecture: The immune response to intracellular pathogens. The immune response to extracellular pathogens.
Practical: The immune response to intracellular pathogens. The immune response to extracellular pathogens.

11th week:

12th week:
Lecture: Tumor immunology, monoclonal antibodies, monoclonal antibodies in tumor therapy
Practical: Tumor immunology, monoclonal antibodies, monoclonal antibodies in tumor therapy

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CHAPTER 18

therapy
devlopment of B and T lymphocytes. Central tolerance.

13th week:
Lecture: Transplantation. Immunodeficiencies.
Practical: Transplantation. Immunodeficiencies.

14th week:
Lecture: Generation of B- and T-cell diversity,
Practical: Generation of B- and T-cell diversity, development of B and T lymphocytes. Central tolerance.

Self Control Test

Requirements

Signing of the Lecture Book:
Participation in the Seminars and the Practical Courses is compulsory. The Department shall refuse to sign the students' Lecture book if he/she is absent from more than two seminars during semester.

Self control tests (SCTs), offered grades, end-term exam:
During the semester two self control test (SCT) will be organised (weeks 8 and 14).
The first SCT contains the material of the lectures of weeks 1-7 as well as the material of seminars on weeks 1-7. To ensure a solid basic knowledge of immunology, students must score higher than 60% to qualify for the 2nd SCT, hence for an offered grade.
The 2nd SCT contains the material of lectures 8-13 and seminars 8-13
If a student's score for the first SCT is higher than 60% and the score of the second SCT is higher than 50%, she/he will be offered a grade. Should student accept this offered grade, she/he will be exempted from the end-term exam.
The offered grades are calculated by the following algorithm, based on the cumulative percentage points of the two SCTs (i.e. 200 points maximum).

110 - 139: pass (2)
140 - 149: satisfactory (3)
150 - 169: good (4)
170 – 200: excellent (5)

Those students who have not qualified for an offered grade must take the end-term exam during the exam period. The end-term exam consists of a written and an oral part.
"A" exam: To qualify for the oral part of an "A" exam, students must score higher than 70% on the written (entry) exam. Students who score less than 70% on the written part will fail (thus, the oral exam will not take place).
"B" exam: "B" exams are identical to "A" exams except when the student failed the oral, but not the written, part of the "A" exam. With a score of higher than 70% on the written part of the "A" exam, the student is exempt from the written exam on the "B" exam.
"C" exam: "C" exams are oral exams only, without a written entry test.
Those students who would like to improve the grade of a successful ("A" or "B" exam) or do not accept the offered grade, are also exempted from the entry test.
The list of exam topics is available on the departmental website (www.elearning.med.unideb.hu).
Lecture materials and other information concerning education can be found on our website at www.elearning.med.unideb.hu.
ACADEMIC PROGRAM FOR THE 3RD YEAR

Department of Laboratory Medicine

Subject: CLINICAL BIOCHEMISTRY II.
Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Lecture: 56
Seminar: 8
Practical: 28

1st week:
Lecture: Clinical Biochemistry II. 1. Coagulopathies, (general introduction), haemophilia, other coagulopathies
2. von Willebrand disease
3. Platelet function disorders
Clinical physiology:
Introduction, cellular and molecular factors of pathologic cardiac excitability.
Practical: Laboratory informatics

2nd week:
Lecture: Clinical Biochemistry II. 4. Inherited thrombophilias
5. Acquired thrombophilias
6. Prethrombotic state, thromboembolias, consumption coagulopathies
Clinical Physiology:
Pathologic contractile function of the heart (contractile proteins, intracellular Ca2+-homeostasis and cardiac pumping)
Practical: Laboratory diagnostics of coagulopathias

3rd week:
Lecture: Clinical Biochemistry II. 7. Laboratory diagnosis of autoimmune diseases.
8. Disorders of sodium and water metabolism I.
9. Disorders of sodium and water metabolism II.
Clinical Physiology:
Myocardial ischemia, myocardial infarction and new ischemic syndromes (hibernation, preconditioning, stunning)
Practical: Laboratory diagnostics of platelet functions disorders. Laboratory monitoring of antiplatelet therapy.

4th week:
11. Disturbances of the acid-base balance
12. Laboratory diagnostics of renal disorders
Clinical Physiology: Cardiac hypertropy and failure.
Practical: Laboratory diagnostics of Thrombophilia. Laboratory monitoring of anticoaguilant therapy.

5th week:
Lecture: Clinical Biochemistry II. 13. Patobiochemistry of the renal function I.
14. Patobiochemistry of the renal function II.
15. Hypoglycaemias
Clinical Physiology:
Heart failure (molecular pathophysiology)
Practical: Laboratory diagnostics of renal disorders

6th week:
Lecture: Clinical Biochemistry II. 16. Pathogenesis and pathomechanism of diabetes mellitus
17. Patobiochemistry and clinical biochemistry of the acute complications of diabetes mellitus
18. Laboratory diagnostics of diabetes mellitus
Clinical physiology: Endothelium, smooth muscle, vessels.
Practical: Examination of urine sediment

Self Control Test
7th week:
Lecture:
20. Laboratory diagnostics of hyperlipidemia
21. Risk factors of atherosclerosis

Clinical physiology: Hypertension

Practical: Basic laboratory methods in metabolic diseases

8th week:
Lecture:
Clinical Biochemistry II. 22. Laboratory diagnostics of acute coronary syndrome I.
23. Laboratory diagnostics of acute coronary syndrome II.
24. Laboratory diagnostics of hyperuricaemia and gout.

Clinical Physiology: New translational perspectives in cardiovascular medicine.

Practical: Case presentation

9th week:
Lecture:
Clinical Biochemistry II. 25. Pathobiochemistry of liver disorders
26. Laboratory diagnostics of liver disorders.
27. Pathobiochemistry of acute hepatic disorders.
28. Pathobiochemistry and laboratory diagnostics of cholestasis and cirrhosis.

Clinical Physiology: Stem cells in cardiovascular medicine.

Practical: Laboratory investigation of cerebrospinal fluid and other body fluids.

10th week:
Lecture:
Clinical Biochemistry II. 28. Laboratory diagnostics of liver disorders. Patobiochemistry of acute hepatic disorders. 29. Pathobiochemistry and laboratory diagnostics of cholestasis and cirrhosis
30. Pathobiochemistry and laboratory diagnosis of autoimmune liver diseases.

Clinical Physiology: Cellular and molecular elements of the respiratory system with clinical significance.

Seminar: Clinical Physiology: The basics of EKG.
Practical: Separation techniques.
Self Control Test

11th week:
Lecture:
31. Pathobiochemistry and laboratory diagnostics of the gastrointestinal tract I.
32. Pathobiochemistry and laboratory diagnostics of the gastrointestinal tract II.
33. Laboratory diagnostic of acute pancreatitis

Seminar: Clinical Physiology: ECG diagnosis of arrhythmias I.
Practical: Laboratory diagnostics of myocardial infarction, POCT.

12th week:
Lecture:
34. Clinical biochemistry of hypothalamus and hypophysis
35. Pathobiochemistry of thyroid disorders.
36. Laboratory diagnostics of thyroid functions.

Clinical Physiology: Clinical physiology of nutrition and metabolism.

Seminar: Clinical physiology: ECG diagnosis of arrhythmias II.
Practical: Laboratory evaluation of autoimmune diseases.

13th week:
Lecture:
38. Pathobiochemistry and laboratory diagnostics of adrenal cortex disorders.
39. Pathobiochemistry and laboratory diagnostics of adrenal medulla disorders.
Clinical Physiology: Clinical physiology of the nervous system I.

**Seminar:** Clinical Physiology: Angina pectoris, myocardial
**Practical:** Laboratory evaluation of liver and pancreas function.
**Self Control Test**

14th week:
**Lecture:** 40. Clinical biochemistry of gonadal functions.
41. Laboratory diagnostics of bone disorders.
42. Laboratory diagnostics of muscle disorders.

Clinical Physiology: Clinical physiology of the nervous system II.

**Practical:** Laboratory evaluation of liver and pancreas function-case presentation.

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**Requirements**

Clinical Biochemistry - Participation on practicals: Attendance of practicals is obligatory. Altogether one absence in the first semester and two absences in the second semester are permitted. In case of further absences, the practicals should be made up for by attending the practicals with another group in the same week, or a medical certificate needs to be presented. Please note that strictly only a maximum of 2 students are allowed to join another group to make up for an absence.

Requirements for signing the Lecture book: The Department may refuse to sign the Lecture book if the student is absent from practicals more than allowed in a semester.

Assessment: At the end of the first and second semester there is a written examination (test) assessed by a five grade evaluation.
The C chance is an oral exam

Requirements for examinations: The examination is based on the lecture and practical material (Practicals in Laboratory Medicine, eds.: János Kappelmayer and László Muszbek, 2016) as well as the relevant chapters from the textbook of Marshall: Clinical Chemistry (8th edition, 2017).

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Department of Pharmaceutical Chemistry

**Subject:** PHARMACEUTICAL CHEMISTRY PRACTICE II.

Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Practical: 28

1st week:
**Practical:** Safety instructions, requirements.

2nd week:
**Practical:** Carbohydrates.

3rd week:
**Practical:** Imipramine, promethazine, trimethoprim, quinine.

4th week:
**Practical:** Coffein, theobromine, theophylline, allopurinol.

5th week:
**Practical:** Analysis of china alkaloids, drotaverin, papaverin. Quareline tablet.

6th week:
**Practical:** Investigation of the Boron-Zinc ointment; investigation of Pulvis Chinacisalis
**CHAPTER 18**

**7th week:**
**Practical:** Analysis of Suppositorium analgeticum and Rutascorbin tablet.

**Requirements**
See the requirements in the first semester.

**Subject:** **PHARMACEUTICAL CHEMISTRY THEORY II.**
**Year, Semester:** 3rd year/2nd semester
**Number of teaching hours:**
**Lecture:** 56

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14th week:

Requirements

Attendance to lectures is emphatically recommended. All material covered in lectures is an integral part of the subject and therefore included in the final exam. Several new concepts and ideas are discussed in the lectures only and are not present in the textbook. Final examination is possible only after successfully finished and accepted laboratory practices 1+2. Final exam contains all topics from Pharmaceutical Chemistry Theory lecture I and II.

Department of Pharmaceutical Technology

Subject: PHARMACEUTICAL TECHNOLOGY PRACTICE III. (INDUSTRIAL PRACTICE II.)
Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Practical: 56

1st week:

2nd week:
Practical: Soutio pro dialysi peritoneale I. (Ph.Hg.VII.)
Solutio anticoagulans “ACD” (Ph.Hg.VII.)

3rd week:
Practical: Collins “C” solution
Kardiostop I. solution

4th week:
Practical: Oculogutta neomycini (FoNo.VII.).

5th week:
Practical: Test from infusions and eye preparations.

6th week:
Practical: High-shear granulation.

7th week:
Practical: Fluid bed granulation.

Oculentum simplex (Ph.Hg.VII.).
Oculentum hydrosum (Ph.Hg.VII.)
Oculentum neomycini FoNo VII.
8th week:
Practical: Hard gelatin capsules, capsule filling and pharmacopoeial tests.

9th week:
Practical: Tablet compression, process parameters and tablet qualification.

10th week:
Practical: Test from tableting.

11th week:

12th week:

13th week:

14th week:
Practical: Cosmetics. Aim, possibilities and formulation techniques, equipment.

Test.

Requirements
You have to attend every practical in Industrial Practice during the 14 weeks. If you are not able to go to practice, you have to bring us certification by a doctor. But on 1-2 occasions if you have very important activity, please foretell it us, and we will discuss when we have any possibility to replace you them. These occasions will be valid exception the tests.
You have 5 weeks tableting, galenic and aseptic lab as well. At the 13th week, you write a big test from both parts (tableting, galenic, aseptic) and get individual mark for every part. The average of these tree marks will be your practical mark. None of them can be a fail (1) mark. If you fail your test, you have got only one more chance to improve your test. If you get a fail mark for the improvement test, you have to write a test from both parts again and the mark of this test will be the final practical mark. In case you do not pass this test, you are not able to get the final signature from Industrial practice.
The final practical grade will be the average of tableting lab, galenic lab and aseptic lab marks but none of the marks can be fail (1).
If you want to improve your practical mark, you have to write an improvement test from both parts.

Subject: PHARMACEUTICAL TECHNOLOGY PRACTICE III. (PRESCRIPTION WRITING III.)
Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Practical: 56

1st week:

2nd week:
Practical: Course: Prescription Pharmacy Vaginal dosage forms (ovulum, globulus, globulus vaginalis longiformis), Preparation of Peritoneal dialysis. Solutio pro dialysi peritoneale I. (Ph.Hg VII.) Solutio pro dialysi peritoneale II. (Ph.Hg VII.)
suppositories by the help of cold compression with Theobroma oil. 1. Ovulum nystatini FoNo VII. 2. Globulus glycerini boraxati FoNo VII. 3. Globulus zinci sulfurici (individual composition) (ZnSO4 1,60g; Butyrum cacao 10,0g; for 4 globuli). Course: Sterile and aseptic formulations. Cytostatic infusion solutions. Perfusion solutions. Collins solution. Kalium dihydrogenphosphoricum 2,05g. Glucosum anhydricum 25,0g. Magnesium sulfuricum 7,4g. Procainium chloratum 0,1g. Aqua dest. pro inj. ad 500ml. Collins solution (SZOTE). Kalium dihydrogenphosphoricum 2,05g. Kalium hydrophosphoricum 9,70g. Kalium chloratum 1,12g. Natrium hydrogencarbonicum 0,84g. Aqua dest. pro inj. ad 1000ml.

3rd week:
Practical: Course: Prescription Pharmacy
Divided powders. 1. Pulvis antidoloricus FoNo VII. 2. Pulvis asthmalyticus fortis FoNo VII. 3. Pasta contra solarem FoNo VII. 4. Cremor aquosus FoNo VII. Course: Sterile and aseptic formulations. Plasma substitute infusion solutions. Cardiostop solutions. Cardiostop I. solution. Natrium chloratum 0,4g. Kalium chloratum 0,3g. Magnesium chloratum sol. 50% 0,3g. Glucosum anhydricum 1,5g. Mannitum 20,6g. Aqua dest. pro inj. ad 500,0ml. Solutio anticoagulans ACD(Ph.Hg.VII.).

4th week:
Practical: Course: Prescription Pharmacy
Incompatibilities. 1. Incompatibility 1. 20,0g 2. Incompatibility 2. 150,0g 3. Incompatibility 3. 100,0g 4. Incompatibility in suppository. (Codein. 0,24g; Aspirin 3,00g, Phenacetin 3,00g, Adeps solidus 3 instead of Adeps solidus 50) Course: Sterile and aseptic formulations. Ophthalmic ointments, Oculentum simplex Ph.Hg.VII. 50,0g, Oculentum hydrosom Ph.Hg.VII 20,0g, Oculentum neomycini FoNoVII 10,0g

5th week:
Practical: Course: Prescription Pharmacy
Sparsorium. 1. Sparsorium antisudoricum FoNo VII. 2. Sparsorium contra pruritum FoNo VII. 3. Incompatibility 4. 30,0g (ointment) 4.

Incompatibility 5. 10p.(powder) Course: Sterile and aseptic formulations. Test.

6th week:

7th week:

8th week:

9th week:

10th week:

11th week:
Practical: Course: Prescription, Pharmacy
Individual drug preparation practice. Course: Galenic preparations and their manufacture. Preparation and investigation of ointments and...
creams.

12th week:

**Practical:** Course: Prescription Pharmacy 35.
Mixtura pectoralis adde Dionin FoNo VII. 36.
Suppositorium antipyreticum pro parvulo FoNo VI. 37.
Pulvis paracetamoli cum codeino FoNo VII. 38.
Unguentum antirheumaticum FoNo VII.

Course: Galenic preparations and their manufacture. Preparation and investigation of suspension ointments and pastes.

13th week:

**Practical:** Course: Prescription, Pharmacy Test 2.

2. Course: Galenic preparations and their manufacture. Preparation and investigation of suppositories.

14th week:

**Practical:** Course: Prescription, Pharmacy 39.
Unguentum antiphlogisticum pro infante FoNo VII. 40.
Unguentum ichthyolsalicylatum FoNo VII. 41.
Pulvis cholagogus FoNo VII. 42.
Unguentum dermophylicum FoNo VII.

Course: Galenic preparations and their manufacture. Preparation and investigation of powders.

Requirements

You have to attend every practical in Pharmaceutical Technology. If you are not able to go to practice, you have to bring us certification by a doctor. However, 1-2 occasions if you have very important activity, please foretell it us, and we will let you know the makeup of practice. These occasions will be valid exception the tests.

You have to get ready for practical. We will give you guidelines of practical and we will discuss them. You have to study them at home. You have to write protocol about the practical according to our discussion and practical notes, so you have to bring with you a note book and you have to write the medicines in prescription form.

We will measure back your preparations after the practice. At least 5 preparations will be measured back. If the grade of the measuring is failed, you must prepare it once more, but the average of the marks has to be at least satisfactory (3).

You will write short tests in most practices and 2 summery tests. This short test will contain measurement conversions, latin words and phrases, definitions etc. The summery tests will contain the knowledge of Pharmaceutical Technology practice. If you fail your summery test, you have got only one more chance to improve your test. In case of improvement the summery test mark will be the average of the first and the improved test. The mark of each summery test has to be a pass (2) or more then more pass (2) mark. If one or two summary test mark is a fail (1) mark at the end of semester, the practical grade will be a fail (1) mark as well.

During the semester the students will have one or more individual drug preparation as well. The average mark shouldn’t be fail (1) mark for individual drug preparation, or the teacher my refuse the signing of practice.

During the practice if the teacher recognizes any mistake that occurs because the student is not well prepared, the student may get a fail (1) mark for that practice. Besides, the teacher may give mark form 1-5 after every practice according to the student’s individual practice work, expenditure of preparation, clean and order of workplace, proper use of equipment, and proper behaviour.

This final grade will be the average of 2 summery tests, grade of short tests from prescription pharmacy lab, the grade of measuring back, grade of individual drug preparation and all other marks.

At the end of the semester you will get 5-stage practical grade.
Subject: **PHARMACEUTICAL TECHNOLOGY THEORY III.**

Year, Semester: 3rd year/2nd semester

Number of teaching hours:

Lecture: **28**

**1st week:**


**2nd week:**

**Lecture:** Dragée. The process of coating. The methods of coating (sugar coating, film coating, gastric coating, enteric coating.). Dry coating.

**3rd week:**

**Lecture:** Formulation of dragée by fluidization. Equipment for coating. Dragée core and the temperature of drying. Investigations of dragée.

**4th week:**


**5th week:**

**Lecture:** Blood and blood preparations. Blood preservative solutions. Solutions for volume substitution.

**6th week:**

**Lecture:** Parenteral nutritive infusions, fat emulsions. “All in one” mixtures.

**7th week:**

**Lecture:** Ophthalmic pharmaceutical forms, definitions. Anatomy of the eye, biopharmacy problems. Requirements for ophthalmic pharmaceutical forms. (compatibility, without irritation, free from bacteria, stability). Basic principles for pharmaceutical formulation

**8th week:**

**Lecture:** Special ophthalmic pharmaceutical forms, contact lamella, contact lens. Tanks., ear drops, nasal drops

**9th week:**

**Lecture:** Pharmaceutical dosage forms formulated by extraction. Basic requirements of extraction. Factors influenced by extraction. Methods of extraction. (Maceration, turbo-extraction, hydro-extraction, perfusion extraction, extraction with reverse flow.)

Extracts, tinctures. Decoctions, Infusions.

**10th week:**


**11th week:**


**12th week:**

**Lecture:** Stability of drugs. Principles of reaction kinetics and the use of reaction kinetics in pharmaceutical technology. Rapid stability investigations.

**13th week:**

**Lecture:** Directions for Good Manufacturing Practice (GMP)

**14th week:**

**Lecture:** Consultation.

**Requirements**

Students have to attend 30% of the lectures.
Requirements for signing the Lecture book: The Department may refuse to sign the subject if the student didn’t attend 30% of lectures according to attendance list.

At the end of semester students have oral exam. The prerequisite of oral exam is a written test before exam. If student doesn’t write more than 60% and fail the written test, it is prohibited to take an oral exam and get a fail (1) mark.

Faculty of Pharmacy

Subject: PUBLIC PHARMACY PRACTICE AFTER 3RD YEAR (PREPARATION OF PHARMACEUTICAL DOSAGE FORMS, MANAGEMENT-QUALITY ASSURANCE, DISPENSING, PHARMACEUTICAL BUSINESS ADMINIST)

Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Practical: 120

Requirements

Syllabus for the practice in a public pharmacy after third year

Duration of practice: 4 weeks, 8 hours daily, from which 2 hours may be spent preparing individually. The student is required to gain proficiency in the following areas during his/her practice at a public pharmacy, and subsequently acquire knowledge about pharmacy operation including dispensing medication, preparing medication, validation and quality assurance, and the overall operation of the pharmacy.

Requirements for the student: Accept and sign the non-disclosure document. Absence from practice must be authentically justified based on the rules of the place of training. Absences must be made up. He/she is expected to follow the guidance of the pharmacist in charge of the training.

Skills expected from the student after the completion of practice:
- practical application of the theoretical knowledge obtained during his/her studies
- he/she is expected to know the premises and the assets of the public pharmacy and be able to get information from manuals and scientific journals used during his/her work
- he/she is expected to learn about the work activities of a public pharmacy
- he/she is required to have an appropriate working relationship with the co-workers at the pharmacy
- he/she is expected to know the rules and regulations pertaining to the operation of pharmacies
- he/she is required to explore the possibilities of communicating with patients

The student’s tasks during the practice:
Under the supervision of the pharmacist in charge of the training he/she participates in the following activities:
1. Preparation of medicine. In the process he/she is required to learn: How to prepare magistral/individual formulations according to the rules and to recognize incompatibilities
- The legal possibilities of changing the original prescription
- The rules of labelling and their application (identifiability of manufacturer and patient, application, administration, shelf-life)
• Documentation of preparation, and administrative obligations
• Storage of materials, processing of basic formulations and subsequent administrative obligations
Formulations of the compendium and FoNo

2. Operation and quality assurance. In the process he / she is required to learn
• administrative work in the pharmacy
• standard procedures for workflow
• how to check and document workflow
• the rules pertaining to the examining and sampling incoming medications, documentation of examinations

3. Drug dispense. In the process he / she is required to learn
• how to check the content and layout of the prescription
• the database of nutrition complements and medicinal formulae
• adequate application of the computer program.

He / she is expected to get acquainted with the process and documentation of drug dispensing, and communication with patients
• the notion of pharmacy care and its practical ramifications

4. Medicine ordering. In the process he / she is required to learn:
• how to order medicine
• about narcotics and activities involving their handling
• the rules pertaining to hazardous waste

Evaluation: Keeping an electronic notebook: description of 1 syllabus-related practical problem in half / one page. The pharmacist in charge of the training checks the work and description every second week and evaluates it using a five-grade system. He /She sends the electronic notebook to the Dean’s Office according to the rules of the place of training. At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place. Student evaluation: After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.
### ACADEMIC PROGRAM FOR THE 4TH YEAR

#### Department of Biopharmacy

**Subject:** PHARMACEUTICAL BIOANALYTICS AND BIOTECHNOLOGY I.

**Year, Semester:** 4th year/1st semester  
**Number of teaching hours:** Lecture: 28

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<tr>
<th>Week</th>
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<tr>
<td>1st</td>
<td>Modern biotechnology (history, basic concept)</td>
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<td>2nd</td>
<td>Biotechnology methods and biotechnology products in therapy</td>
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<td>3rd</td>
<td>Production of biotechnological drugs I.: fermentation</td>
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<td>4th</td>
<td>Production of biotechnological drugs II.: recombinant technology, GMO</td>
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<td>5th</td>
<td>Gene technology I.: GH, insulin, enzymes, mABs, cytokines</td>
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<td>6th</td>
<td>Gene technology II.: vaccines, antibiotics</td>
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<td>7th</td>
<td>Gene technology III.: gene therapy, personalized medication</td>
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<td>8th</td>
<td>Gene technology IV.: stem cells, stem cells in therapy, cell banks.</td>
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<td>9th</td>
<td>Gene technology V.: pharmaco genetics, pharmaco genomics, HGP, ENCODE project</td>
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<td>10th</td>
<td>Modern drug delivery systems, nano and biotechnology based therapies.</td>
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<td>11th</td>
<td>Biotechnology based targeted (cancer) therapies</td>
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<td>12th</td>
<td>Industrial production: documentation, QA, QC, validity</td>
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<td>13th</td>
<td>Regulation, biosimilar products, FDA/EMA regulation, Ethics of biotechnology, future directions</td>
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<td>14th</td>
<td>Self Control Test</td>
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#### Requirements

At least 30% of the lectures must be visited. Students have to write two self control tests, in the middle of the semester and at the end of the semester. One of the self control tests must reach at least 60%. If none of the test results reach at least 60%, the student is not allowed to take the End of Semester Exam (ESE). At the end of the semester, students have to take an oral End of Semester Exam in Pharmaceutical Bioanalytics and Biotechnology. During the semester there is an opportunity to be freed from the constraint of the End of Semester Exam, if both of the self control tests are above 60%. If they are
above 60% the average of the tests will be calculated to offer a grade.

Without taking the exam, students are offered a grade calculated from the two self control tests passed during the semester: 60% or above - pass (2), 70% or above – satisfactory (3), 80% or above – good (4), 90% or above – excellent (5).

Correction of the offered grade is in the form of taking the oral ESE instead. The result of the exam can be better or even worse than the offered grade.

Department of Medical Microbiology

Subject: **MEDICAL MICROBIOLOGY I.**
Year, Semester: 4th year/1st semester
Number of teaching hours:
Lecture: 28
Seminar: 10
Practical: 10

**1st week:**
**Lecture:** The microbial word. Pharmaceutical importance of microbes. Prokaryotic cell structure.
**Practical:** Laboratory safety instructions. Bacterial normal flora. Collection of clinical samples, sample processing.

**2nd week:**
**Lecture:** Morphology and physiology of bacteria. Pathogenesis and infection. Bacterial genetics.
**Practical:** Examination of microscopic morphology of bacteria. Microscopic techniques (dark field and phase contrast microscope, electron microscopy). Unstained specimens. Staining methods (Gram-, Ziehl-Nielssen-and Neisser- staining).

**3rd week:**
**Lecture:** Host defenses against bacterial infections. Immunological basis of vaccination.
**Practical:** Culture techniques (culture conditions, media, colony morphology). Identification of bacteria (examination of biochemical activity). Diagnosis of anaerobic infections.

**4th week:**
**Lecture:** Passive and active immunization.

**5th week:**
**Lecture:** Principles of antibacterial chemotherapy, major groups of antibiotics and their mechanism of action. Mathematical description of the antibiotic effect. Antibiotic policy.
**Practical:** Methods for testing antibiotic susceptibility. Examination of antibiotic interactions.

**6th week:**
**Lecture:** Gram-positive cocci and rods. Gram-negative cocci. Acid-fast bacteria
**Practical:** Development and clinical trial of antibiotics.

**7th week:**
**Lecture:** Gram-negative coccobacilli. Gram-negative rods. Curved rods.
**Seminar:** Diagnosis of enteric bacterial infections.

**8th week:**
**Lecture:** Mycoplasms and obligatory intracellular bacteria. Spirochaetes.
Seminar: Bacterial respiratory infections. Antituberculotic agents.

9th week:
Lecture: Cell wall synthesis inhibitors.

10th week:
Lecture: Protein synthesis inhibitors.
Seminar: Urinary tract infections. Bacterial sexually transmitted diseases (STD)

11th week:
Lecture: Antibiotics interfering with nucleic acid metabolism and antimetabolite antibiotics.
Seminar: Antibacterial agents for the treatment of meningitis and urinary tract infections.

12th week:
Lecture: Fungal cell structure, physiology, virulence.
Seminar: Types and mechanisms of clinically relevant antibiotic resistance.

13th week:
Lecture: Antifungal agents. Medically important fungal pathogens.
Seminar: Diagnosis of fungal infections.

14th week:
Seminar: Antimicrobial agents in clinical practice.

Requirements

Participation in the practical courses and seminars is obligatory. The Department may refuse to sign the students' Lecture book if they are absent from more than two practices or seminars in a semester.

At the end of 1st semester the student is required to take an end-semester examination based on the whole material of the lectures, practices and seminars of the semester. The examination consists of a written test and an oral examination.

Department of Pharmaceutical Technology

Subject: PHARMACEUTICAL TECHNOLOGY THEORY IV.

Year, Semester: 4th year/1st semester
Number of teaching hours:
Lecture: 28

1st week:

2nd week:

3rd week:
Lecture: Drug delivery in plastics ages.

4th week:
Lecture: Drug delivery in modern health I.

5th week:
Lecture: Drug delivery in modern health II.

6th week:
Lecture: Transdermal therapeutic system.

7th week:
Lecture: Nasal and inhalation therapeutic systems.
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<td>8th</td>
<td>Lecture: Pharmaceutical and formulation consideration in medicine design.</td>
</tr>
<tr>
<td>9th</td>
<td>Lecture: Special aspects in the field of pediatrics and geriatrics.</td>
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<tr>
<td>10th</td>
<td>Lecture: Parenteral therapeutic system. Ocular therapeutic system.</td>
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<tr>
<td>12th</td>
<td>Lecture: Dragée. Coating. Types of coating.</td>
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<tr>
<td>13th</td>
<td>Lecture: Bioequivalent and biosimilar drugs.</td>
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<tr>
<td>14th</td>
<td>Lecture: Discussion for final exam.</td>
</tr>
</tbody>
</table>

**Requirements**

Students have to attend 30% of the lectures.

Requirements for signing the Lecture book: The Department may refuse to sign the subject if the student didn’t attend 30% of lectures according to attendance list.

At the end of semester students have oral exam. The prerequisite of oral exam is a written test before exam. If student doesn’t write more then 60% and fail the written test, it is prohibited to take an oral exam and get a fail (1) mark.

**Subject:** PHARMACEUTICAL TECHNOLOGY PRACTICE IV. (INDUSTRIAL PRACTICE III.)

Year, Semester: 4th year/1st semester
Number of teaching hours:
Practical: 42

<table>
<thead>
<tr>
<th>Week</th>
<th>Practical</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td>Practical: Injections</td>
</tr>
<tr>
<td>2nd</td>
<td>Practical: Injectio natrii chlorati 100 mg/ml (Ph.Hg.VII.).</td>
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<tr>
<td></td>
<td>Injectio kalii chlorati 100 mg/ml (Ph.Hg.VII.)</td>
</tr>
<tr>
<td>3rd</td>
<td>Practical: Sterilization method in Autoclave.</td>
</tr>
<tr>
<td>4th</td>
<td>Practical: Injectio aethy1morphinii chlorati 20 mg/ml.</td>
</tr>
<tr>
<td></td>
<td>Injectio acidi ascorbici 10%.</td>
</tr>
<tr>
<td>5th</td>
<td>Practical: Injection Test.</td>
</tr>
<tr>
<td>6th</td>
<td>Practical: Industrial production of granules and tablets, Pharmacopoeial tests, dissolution tests</td>
</tr>
<tr>
<td>7th</td>
<td>Practical: Oral modified and controles release tablets, theory and production.</td>
</tr>
</tbody>
</table>
8th week:
Practical: Pan coating, theory and practice, excipients and steps of sugar coating.

9th week:
Practical: Fluid bed coating.

10th week:
Practical: Test from tableting.

12th week:
Practical: Galenic preparation 1

13th week:
Practical: Galenic preparation 2

14th week:
Practical: Galenic preparation 3; Test from galenic preparation

Requirements
You have to attend every practical in Industrial Practice during the 14 weeks. If you are not able to go to practice, you have to bring us certification by a doctor. But on 1-2 occasions if you have very important activity, please foretell it us, and we will discuss when we have any possibility to replace you them. These occasions will be valid exception the tests.

You have 5 weeks tableting, galenic and aseptic lab as well. At the 13th week, you write a big test from both parts (tableting, galenic, aseptic) and get individual mark for every part. The average of these tree marks will be your practical mark. None of them can be a fail (1) mark. If you fail your test, you have got only one more chance to improve your test. If you get a fail mark for the improvement test, you have to write a test from both parts again and the mark of this test will be the final practical mark. In case you do not pass this test, you are not able to get the final signature from Industrial practice.

The final practical grade will be the average of tableting lab, galenic lab and aseptic lab marks but none of the marks can be fail (1).

If you want to improve your practical mark, you have to write an improvement test from both parts.

Department of Pharmacology

Subject: PHARMACEUTICAL AND BIOANALYTICAL CHEMISTRY I.
Year, Semester: 4th year/1st semester
Number of teaching hours:
Lecture: 28
Seminar: 14

1st week:
Lecture: Introduction, the role of analytical and bioanalytical chemistry in pharmaceutical and medical sciences.
Seminar: Introduction, announcement of requirements.

2nd week:
Lecture: Sampling and sample preparation, preparation of applied materials and labor-wares.
Seminar: Functional groups.

3rd week:
Lecture: Sample preparation II.: LLE, CLLE, SPE, MEPS, SPME, LPME, ASE, MAE, SFE.
Seminar: Samples in the pharmaceutical industry.

4th week:
Lecture: Molecular spectroscopy I.: Base principles and application of IR spectroscopy in pharmaceutical sciences.
Seminar: System suitability, LOD, LOQ..
5th week:
**Lecture:** Structural identification of small organic compounds by mass spectrometry (EI-MS). Basics, construction of MS equipments (EI-CI-FAB-FIB-MALDI ion sources).
**Seminar:** Structure identification (IR, UV-VIS, EI-MS).

6th week:
**Lecture:** Molecular spectroscopy II.: Basics and application of UV-VIS spectrophotometry in drug metabolism and bioanalytics.
**Seminar:** Consultation from the lecture materials.

7th week:
**Lecture:** 1st Self-control test
**Seminar:** Demonstration of instruments and equipments (IR, UV-VIS, DI-MS, SPE, SPME, MEPS, etc.).

Self Control Test

8th week:
**Lecture:** Chromatographic separation I.: basic principles of chromatography, chromatographic techniques TLC, 2D TLC, affinity chromatography, column chromatography, SEC.
**Seminar:** Consultation of the 1st SCT.

9th week:
**Lecture:** Chromatographic separation II.: Basic principles and application of GC, HPLC and SFC in drug development and pharmaceutical industry.
**Seminar:** Calibration, chromatographic parameters.

10th week:
**Lecture:** Drugs, drug related substances, metabolites, degradation products in the environment (sources, effects, measurement possibilities, prevention).
**Seminar:** Units, unit conversion, dilution, concentration, calculation of concentration.

11th week:
**Lecture:** Classification of drug impurities.
**Seminar:** Instrumental demonstration (GC, HPLC).

12th week:
**Lecture:** Identification and measurement of drug impurities.
**Seminar:** Consultation from the lecture and seminar materials.

13th week:
**Lecture:** 2nd Self-control test
**Seminar:** Self-Control test
Self Control Test

14th week:
**Lecture:** Consultation
**Seminar:** Consultation

**Requirements**

At least 30% of the lectures must be visited. Students have to write each of the two control tests and one from the seminar. The requirements for the signature: I. the average of the self control tests from the theory must be minimum 40%. II. The result of the seminar test must be minimum 75%!

Subject: **PHARMACOLOGY PRACTICE I.**
Year, Semester: 4th year/1st semester
Number of teaching hours:
Practical: **56**

1st week:
**Practical:** Introduction to pharmacology.

2nd week:
**Practical:** Receptors and signaltransduction.
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3rd week:
Practical: Neurotransmission and neurotransmitters in the CNS.

4th week:
Practical: General anesthetics.

5th week:

6th week:
Practical: Antiepileptics.

7th week:
Practical: Pharmacologic management of Parkinsonism.

8th week:
Practical: Drugs used in Alzheimer’s Disease.

9th week:
Practical: Migraine.

10th week:
Practical: Central and peripheral skeletal muscle relaxants.

11th week:
Practical: Drugs with important actions on smooth muscle. Local anesthetics.

12th week:
Practical: Basic pharmacology.

13th week:
Practical: Cholinerg-activating and cholinceptor-blocking drugs.

14th week:
Practical: Adrenoceptor-activating and blocking drugs. General consultation on the curriculum of the first semester.

Requirements

During the semester students have to take two exams. Requirements for the signature of the Lecture Book for the semester are at least a pass (2) on both exams. Attendance at seminars is compulsory: the signature may be refused in the case of absences from more than four seminars. Signature is compulsory for the student to be allowed to take the End of Semester Exam (ESE).

The average of the two mid-semester exams provides the grade of the Assessment of Workmanship (AW5) for the Pharmacology I. practice. In case the student does not reach a pass (2) on both mid-semester exams, the signature of the lecture book is refused, and the student fails the semester. In case the student does not reach a pass (2) on one of the mid-semester exams, the student must take a correction exam from all the topics of the semester on the last week of the semester. The grade of the correction exam will be averaged with the two mid-semester exams and this average will give the grade of the AW5 for the Pharmacology I. practice. Further correction of this AW5 grade is not an option.

Subject: PHARMACOLOGY THEORY I.
Year, Semester: 4th year/1st semester
Number of teaching hours:
Lecture: 56

1st week:
Lecture: Introduction to pharmacology of CNS drugs. Neurotransmission and the CNS. General anesthetics.

2nd week:
Lecture: Opioid analgesics and antagonists.
3rd week:
Lecture: Drugs of abuse.

4th week:
Lecture: Sedatohypnotics.

5th week:
Lecture: Antidepressants II and lithium. Antipsychotics.

6th week:
Lecture: Antiepileptics.

7th week:
Lecture: Pharmacologic management of Parkinsonism

8th week:
Lecture: Drugs used in Alzheimer’s Disease

9th week:
Lecture: Pharmacology of ANS drugs

10th week:

11th week:
Lecture: Drugs with important actions on smooth muscle. Local anesthetics.

12th week:
Lecture: Basic pharmacology

13th week:
Lecture: Cholinerg-activating drugs. Cholinoceptor-blocking drugs.

14th week:

Requirements

During the semester students have to take two exams. Requirements for the signature of the Lecture Book for the semester are at least a pass (2) on both exams. Attendance at seminars is compulsory: the signature may be refused in the case of absences from more than four seminars. Signature is compulsory for the student to be allowed to take the End of Semester Exam (ESE).

At the end of the semester from Pharmacology I. theory students take End of Semester Exam (ESE) which is oral. Students draw 3 exam titles from the topics of the first semester. During the semester there is an opportunity to be freed from the constraint of the End of Semester Exam. Without taking the exam, students are offered the grade calculated from the two exams passed during the semester if it is at least good (4) or excellent (5). Correction of the offered grade is in the form of taking the oral End of Semester Exam instead. The result of the exam can be better or even worse than the offered grade.

Department of Preventive Medicine, Faculty of Public Health

Subject: PREVENTIVE MEDICINE AND PUBLIC HEALTH
Year, Semester: 4th year/1st semester
Number of teaching hours:
Lecture: 28
Seminar: 22
Practical: 8
1st week:
**Lecture:** 1. The history, scope and methods of public health and preventive medicine, major public health issues in developing and developed countries
2. Introduction to human ecology
**Seminar:** 1-2. Demographical methods to study the health status of the population

2nd week:
**Lecture:** 3. Air pollution and health
4. Water pollution and health
**Seminar:** 3-4. Principles of prevention

3rd week:
**Lecture:** 5. Toxicology of organic solvents and pesticides
6. Health effect of noise and vibration
**Seminar:** 5-6. Occupational health and safety in pharmacist practice.

4th week:
**Lecture:** 7. Healthy nutrition. Nutritional deficiency disorders
8. Food poisoning
**Practical:** 1-2. Chemical and microbiological examination of drinking water (laboratory practice for small groups)

5th week:
**Lecture:** 9. Health hazards of ionising radiation and radioactive substances
10. Heavy metals in the human environment
9. The general effect of environmental pollution
10. Lifestyle and health
**Practical:** 3-4. Chemical and microbiological examination of drinking water (laboratory practice for small groups)

6th week:
**Lecture:** 11. The general effect of environmental pollution
12. Socioeconomic determinants, inequality and health
**Seminar:** 7-8. Mercury toxicity, case study

7th week:
**Lecture:** 13. Public health consequences of substance abuse
14. Social factors and health
**Seminar:** 9-10. Health promotion, Health education

8th week:
**Lecture:** 15. Introduction into the general epidemiology of non-communicable diseases
16. Epidemiology of mental diseases
**Seminar:** 11-12. Midterm test

9th week:
**Lecture:** 17. Epidemiology of skeletal and dental diseases
18. Epidemiology of neoplastic diseases
**Seminar:** 13-14. Epidemiological measures and studies

10th week:
**Lecture:** 20. Introduction into the general epidemiology of communicable diseases
**Seminar:** 15-16. Preventive strategies

11th week:
**Lecture:** 21. Epidemiology of communicable diseases transmitted through the skin and sexually transmitted diseases
22. Infection control and pharmacy
**Seminar:** 17-18. Reporting and control of communicable diseases, vaccination

12th week:
**Lecture:** 23. Epidemiology of chronic respiratory diseases
24. Epidemiology of respiratory infectious diseases
**Seminar:** 19-20. WHO/HFA database

13th week:
**Lecture:** 25. Epidemiology of viral hepatitis
26. Health policy principles
**Seminar:** 21-22. Sterilization and disinfection
Requirements

Requirements for signing the lecture book
Attendance of lectures is highly recommended. Attendance of the seminars, practices and visits is obligatory. The head of the department can refuse to sign the lecture book if a student is absent more than two times from seminars (including visits) in the semester even if he/she has an acceptable excuse.

Requirements for the final exam
On the eighth week of the semester, writing a midterm test is obligatory. The midterm test consists of multiple choice questions covering the topics of the lectures, seminars and practices of the first 7 weeks. The grade of the midterm test is included into the assessment of the final mark of the subject. If the midterm test is failed, there is no possibility for repetition. The final exam involves written and oral sections covering the topics of all lectures and seminars of the subject. The oral exam covers the topics of all seminars and practices of the semester. The written exam consists of multiple choice test questions related to Environmental Health, Epidemiology and Health Policy. The final grade is assessed on the basis of the average of five marks and it is failed if either the oral or any part (Environmental Health, Epidemiology, Health Policy) of the written exam is graded unsatisfactory. Students should repeat only those section(s) of the final exam that has/have been previously unsuccessful. In this case the final exam is graded according to the average of the passing marks obtained on the first and repeated exams.

Course description
The course covers the main areas of public health: environmental health including the health consequences of air and water pollution, occupational and nutritional health; the principles of epidemiology, the epidemiology and control of communicable and non-communicable diseases. Special attention is given on the main topics underlying nutritional disorders and deficiencies, health hazards of pharmacist's practice and preventive strategies.

Requirements
To acquire knowledge about the principles and the most important issues of environmental health, communicable and non-communicable diseases and health policy.

Methods of education
The education of the subject is based on lectures, seminars, laboratory practices and visits. The practical adaptation of the topics of lectures are highly promoted by seminars. Students will learn about the major public health issues in developing and developed countries and organisation of public health services. The practices are closely related to the environmental health part of the course. During the epidemiology seminars students will learn how to calculate the most important indicators for the measurement of morbidity and mortality. In addition, the epidemiology of communicable and non-communicable diseases will be discussed in detail.

Prerequisite:
immunology, pathology II.
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Department of Biopharmacy

Subject: PHARMACEUTICAL BIOANALYTICS AND BIOTECHNOLOGY II.
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 28
Practical: 56

1st week:
Lecture: Immunoanalytical methods I.: Southern-blotting, Northern-blotting, Western-blotting, dot-blot
Practical: Introduction, laboratory safety instructions.

2nd week:
Lecture: Immunoanalytical methods II.: RIA, ELISA, IHC.
Practical: Protein isolation

3rd week:
Lecture: Isolation of nucleic acids, types of gel electrophoresis, SCG, DNS-chip, Comet assay.
Practical: Protein isolation

4th week:
Lecture: PCR, RT-PCR: basic principles and practical applications.
Practical: Western-blot

5th week:
Practical: Western-blot

6th week:
Lecture: Basic principles of proteomics, applications in medical and pharmaceutical research.
Practical: Isolation of nucleic acids, agarose gel electrophoresis.

7th week:
Lecture: Basics and application in the pharmaceutical research and clinical diagnosis.
Practical: Isolation of nucleic acids, agarose gel electrophoresis.

Self Control Test

8th week:
Lecture: Analytical techniques in clinical diagnosis of selected diseases, laboratory tests.
Practical: Immunohistochemistry.

9th week:
Lecture: Therapeutic Drug Monitoring.
Practical: TLC

10th week:
Lecture: Toxicology. Instrumental analysis of some selected drugs.
Practical: RIA.

11th week:
Lecture: Bioanalysis: the role and importance of bioanalytical experiments in drug research and drug development.
Practical: PCR, RT-PCR.

12th week:
Lecture: Analytical aspects of quality insurance in the pharmaceutical industry.
Practical: ELISA

13th week:
Lecture: Environmental rules, prescriptions and applied analytical methods and techniques in the pharmaceutical industry.
Practical: Microarray

14th week:
Lecture: Self Control Test
Requirements

At least 30% of the lectures must be visited. Students have to write two self control tests, in the middle of the semester and at the end of the semester. If one of the test results will not be at least 60%, the students are not allowed to take final comprehensive oral exam.

Absence of more than one practice is not allowed during the semester. Only students having adequately fulfilled the requirements of practice are allowed to get the signature and take final comprehensive oral exam.

Department of Internal Medicine

Subject: CLINICAL BASICS
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 56
Seminar: 28

1st week:

2nd week:

3rd week:

4th week:

5th week:


6th week:

7th week:

8th week:

9th week:
Lecture: OB-GYN 41. Birth control pills and its side effects. Problems of menstruation 42. Sterility and hormone therapy. Climax and hormone therapy. 43. Pharmacotherapy during pregnancy, side effects. 44. Pharmacotherapy during birth and nursing. Inflammatory diseases
CHAPTER 19

of female organs. Benign and malignancy tumour of the female reproductive organs.

10th week:

11th week:
Lecture: SPRING BREAK

12th week:

Vomiting and diarrhoea in 1st year of life 55. Congenital development disorder.

13th week:
Lecture: 56. Cardiology 57. Hematology. 58.-60. Cancers of CNS (NEUROSURGERY)

14th week:

Department of Medical Microbiology

Subject: MEDICAL MICROBIOLOGY II.
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 14
Seminar: 14

1st week:
Lecture: Human pathogenic protozoa I.

2nd week:
Lecture: Human pathogenic protozoa II.
Seminar: Antiprotozoal drugs.

3rd week:
Lecture: Medically important cestodes and trematodes.
Seminar: Antihelminthic drugs I.

4th week:
Lecture: Medically important nematodes.
Seminar: Antihelminthic drugs II. Drugs against ectoparasites.

5th week:
Lecture: General properties of viruses, pathogenesis, replication strategies.
Seminar: Diagnosis of viral infections, culturing, serology.

6th week:
Lecture: Antiviral agents.
Seminar: Determination of susceptibility to antiviral agents.

7th week:
Lecture: Herpesviruses.
Seminar: Treatment and vaccination of herpes infections.

8th week:
Lecture: Hepatitis viruses.
Seminar: Treatment, vaccination and diagnosis of viral hepatitis.

9th week:
Lecture: DNA viruses: Adeno, Parvo, Papilloma, Pox
Seminar: Congenital and neonatal virus infection.
10th week:
Lecture: Medically important RNA viruses.
Seminar: Treatment and vaccination of respiratory viruses.

11th week:
Lecture: Medically important arbo and robo viruses.
Seminar: Diagnosis of enteric viral infections.

12th week:
Lecture: HIV virus
Seminar: Opportunistic infections.

13th week:
Lecture: Prions
Seminar: Microbial control of pharmaceutical products.

14th week:
Lecture: Sterilization and disinfections.
Seminar: Standards of microbial purity of pharmaceutical products.

Requirements
Participation in the practical courses and seminars is obligatory. The Department may refuse to sign the students' Lecture book if they are absent from more than two practices or seminars in a semester. At the end of the 2nd semester the student is required to take a final examination based on the whole material taught in the Medical Microbiology course. The final examination consists of a written test and oral examination.

Department of Pharmaceutical Surveillance and Economics
Subject: PHARMACEUTICAL MANAGEMENT AND ORGANISATION
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 28

1st week:
Lecture: Scope, goals and tools of Pharmaceutical Management: definition of the main tasks of management, specific aspects of a medicinal product, characteristics of the national and international drug market, international trends in marketing and health care. The trends on pharmaceutical business Statistical and scientific approaches evaluating the health parameters of the country: epidemiology and demographics of the country, (population, life span, death rate, median age, life expectancy, incidence rates).

2nd week:
Lecture: Health care and financing in a macro level, Involvements of the government in health care: principles of central solidarity, benefits for public Health care systems and funds: (funds and costs of national health care system, the drug reimbursement system. social network, centralized vs private hospitals, impacts of economy on the health care funds and relation to macroeconomic indicators GDP, GNP, GVA, GDP, unemployment rate, etc).

3rd week:
Lecture: Specific goals and approach of Health Technology Assessment (HTA). Scientific approach evaluating the health status of individuals: Quality of Life assessments. Impact of Evidence Based Medicine and trials in relation to the processes of national and international drug development and marketing authorization (registration).

4th week:
Lecture: Retail Pharmacy – types of business, function, startup requirements, settlement of daily work. Regulations, laws, guidelines, directives. The legal base of Pharmacy operation and registration of a pharmacy unit. Technical
### Requirements

Concerning attendance of classes, the rules in the Regulations Governing Admission, Education and Examinations of the University of Debrecen are valid.

Conditions of signing the lecture book (by the end of semester): Participation in at least three (3) of 6 interim tests are required for the signature. Those ones who failed will be required to pass the
"end of semester test" in order to obtain signatures.

Exam (semifinal, kollokvium)
The exam will be written and oral exam at the end of the semester which covers all the topics of the semester taken in the lectures or seminars. Written part includes a TEST (single choice, multiple choice, short description or definitions, etc.) and an Oral part (Two topics from selected list of questions provided.) Grade (semifinal mark) The average of the three scores (Test, Topic-1 Topic-2) compose the final mark (1-5 grades). Exemption (full or partial) may be earned - only for those student who had at least 5 tests taken successfully during the semester and reached at least 70%.

Department of Pharmaceutical Technology

Subject: **INDUSTRIAL PHARMACEUTICAL TECHNOLOGY**
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 28
Practical: 14

1st week:
**Lecture:** Treatment of working atmospheres
Filtration of working atmospheres

2nd week:
**Lecture:** Iso-technology

3rd week:
**Lecture:** Dissolution Lyophilization

4th week:
**Lecture:** Filtration of liquids Sterilization

5th week:
**Lecture:** Solid Forms I. Mixing process

6th week:
**Lecture:** Solid Forms II: Conversion into dosage form.

7th week:
**Lecture:** Semi-Solid Forms I. Soft gelatin capsules

8th week:
**Lecture:** Packaging

9th week:
**Lecture:** Liquid Forms I. Content of liquid forms

10th week:
**Lecture:** Materials of containers for liquid forms

11th week:
**Lecture:** Liquid Forms II. Preparation of liquid forms

12th week:
**Lecture:** Filling of liquid forms Design of production plants

13th week:
**Lecture:** Semi-Solid Forms II. Transdermal systems

14th week:
**Lecture:** Consultation

Requirements

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam. Requirements for
signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.

Department of Pharmacology

Subject: PHARMACEUTICAL AND BIOANALYTICAL CHEMISTRY II.
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 28
Practical: 56

1st week:
Lecture: The fate of the drugs in the body (ADMER).
Practical: Introduction, laboratory safety instructions.

2nd week:
Lecture: Bioanalysis in the pharmaceutical industry.
Practical: Gas chromatography (GC): analysis of alcohols.

3rd week:
Lecture: Techniques used for modeling oxidative and non-oxidative drug metabolism.
Practical: Infrared spectroscopy (IR)

4th week:
Lecture: In vitro and ex vivo techniques in the drug metabolism studies.
Practical: High Performance Liquid Chromatography (HPLC).

5th week:
Lecture: Antioxidants
Practical: Mass spectrometry (DI-EI-MS): structural analysis of small organic compounds.

6th week:
Lecture: Antioxidant assays.
Practical: Ultraviolet-Visible (UV-VIS) spectrophotometry.

7th week:
Lecture: 1st self-control.
Practical: Sample preparation (LLE, CLLE, SPE, SPME, MEPS).
Self Control Test

8th week:
Lecture: MS in bioanalysis. Basic principles, APIs, analysers, detectors, vacuum system.
Practical: SPME.

9th week:
Lecture: Hyphenated techniques (GC-MS, LC-MS, SFC-MS, MS-MS).
Practical: UV-VIS-II.: Galvinoxyl assay

10th week:
Lecture: Biosensors.
Practical: GC-MS: qualitative analysis of an unknown powder mixture.

11th week:
Lecture: Validation.

12th week:
Lecture: Analytical aspects of human drug development.
Practical: LC-MS/MS

13th week:
Lecture: 2nd Self-control test
Practical: Self-control test
Self Control Test

14th week:
Lecture: Consultation
Practical: Consultation
Requirements

At least 30% of the lectures must be visited. Students have to write each of the two control tests and one from the practice. The requirements for the signature: I. the average of the self control tests from the theory must be minimum 40%. II. The result of the practice test must be minimum 60%!

Subject: PHARMACOLOGY PRACTICE II.
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Practical: 56

1st week:
Practical: Introduction to Pharmacology II.

2nd week:
Practical: Experimental demonstration I.

3rd week:
Practical: Experimental demonstration II.

4th week:
Practical: Experimental demonstration III.

5th week:
Practical: Experimental demonstration IV.

6th week:
Practical: Antihypertensive agents

7th week:

8th week:
Practical: The gonadal hormones and inhibitors. Uterotonics, tocolytics. Agents that affect bone mineral homeostasis. Thyroid and antithyroid drugs.

9th week:

10th week:

11th week:
Practical: Histamine and antihistaminic drugs. Serotonin, agonists and antagonists.

12th week:

13th week:
Practical: Immunpharmacology

14th week:
Practical: Cancer chemotherap. General consultation on the curriculum of the second semester.

Requirements

During the semester students have to take two exams. Requirements for the signature of the Lecture Book for the semester are at least a pass (2) on both exams. Attendance at seminars is compulsory: the signature may be refused in the case of absences from more than four seminars. Signature is compulsory for the student to be allowed to take the Final Exam (FE).
The average of the two mid-semester exams provides the grade of the Assessment of Workmanship (AW5) for the Pharmacology II. practice. In case the student does not reach a pass (2) on both mid-semester exams, the signature of the lecture book is refused, and the student fails the semester. In case the student does not reach a pass (2) on one of the mid-semester exams, the student must take a correction exam from all the topics of the semester on the last week of the semester. The grade of the correction exam will be averaged with the two mid-semester exams and this average will give the grade of the Assessment of Workmanship (AW5) for the Pharmacology II. Practice. Further correction of this AW5 grade is not an option.

Subject: **PHARMACOLOGY THEORY II.**
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 56

1st week:
**Lecture:** Myocardial ischemia, antianginal drugs. Drugs used in heart failure.

2nd week:
**Lecture:** Agents used in cardiac arrhythmias

3rd week:
**Lecture:** Antihypertensive agents Agents used in hyperlipidemia

4th week:
**Lecture:** Bronchodilators and other agents used in asthma.

5th week:
**Lecture:** Diuretics and antidiuretics Drugs used in disorders of coagulation.

6th week:
**Lecture:** Introduction to the pharmacology of the endocrinology. Hypothalamic and pituitary hormones.

7th week:
**Lecture:** Diabetes mellitus and antidiabetic drugs. General characteristics of steroid hormones. Adrenocorticosteroids and adrenocortical antagonists.

8th week:
**Lecture:** The gonadal hormones and inhibitors. Uterotonics, tocolytics. Agents that affect bone mineral homeostasis. Thyroid and antithyroid drugs.

9th week:

10th week:

11th week:
**Lecture:** Pharmacology of the inflammation, steroid and non-steroid anti-inflammatory drugs, the ergot alkaloids. Pharmacotherapy of rheumatoid arthritis.

12th week:
**Lecture:** Beta-lactam antibiotics. Chloramphenicol, tetracyclines, aminoglycosides. Macrolides. Quinolones. Antiviral chemotherapy and prophylaxis.

13th week:
**Lecture:** Immunopharmacology

14th week:
**Lecture:** Cancer chemotherapy. Toxicology
Requirements

During the semester students have to take two exams. Requirements for the signature of the Lecture Book for the semester are at least a pass (2) on both exams. Attendance at seminars is compulsory: the signature may be refused in the case of absences from more than four seminars. Signature is compulsory for the student to be allowed to take the Final Exam (FE).

At the end of the semester from Pharmacology II. theory students take Final Exam (FE) which is oral. Students draw 2 exam titles from the topics of the second semester and 1 exam title from the topics of the first semester.

Institute of Behavioural Sciences, Faculty of Public Health

Subject: BIOETHICS
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 28

1st week:
Lecture: The concept of bioethics. The distinction between traditional medical ethics and modern bioethics: (1) wider scope and (2) new (society- and patient-oriented) attitude. The emergence of bioethics and the major (social, historical, scientific and philosophical) factors playing central roles in it. Bioethics and pharmacology.

2nd week:
Lecture: The four basic principles of bioethics: (1) nonmaleficiency; (2) beneficience; (3) autonomy; (4) justice. The importance of antipaternalism. The role of classic or modern medical oaths in bioethics. International declarations regarding medical and pharmacological ethics.

3rd week:
Lecture: Patients' rights. The importance of the patients-oriented approach. The Hungarian legal regulations of patients' rights in the light of an international comparison.

4th week:
Lecture: The principle of informed consent. The different aspects of providing appropriate information to patients. Theory and practice of risk communication. The bioethics of the so-called Evidence-Based-Medicine.

5th week:
Lecture: The ethics of scientific research and publications. The very basics of philosophy of science. The ethical problems raised by the recent tendency of commercialization of scientific, medical and pharmaceutical research. The ethical problems of scientific openness. Public vs. private scientific research. The ethics of scientific research and publication in the special area of pharmaceutical research. The ethical relevance of the so-called conflict of interests (a central problem of current bioethics).

6th week:
Lecture: Ethical questions of advertisement of medical tools (drugs etc.). Drugs in the market. The special ethical questions regarding direct-to-consumer (DST) advertisements.

7th week:
Lecture: The ethics of current biotechnology. Various ethical questions raised by recent and future advances of genetics, robotics, nanotechnology, pharmacology and brain-sciences.

8th week:
The ethics of double-blind experimental set-ups. The importance of the placebo-effect.

9th week:
Lecture: The ethical aspects of medical experiments of non-human animals. The possibility of extrapolations of the results of animal experiments to human anatomical, physiological and mental phenomena in the lights of current evolutionary theory. The essential ethical questions concerning the ethical acceptability of animal experimentations in medical and pharmaceutical research. The history of animal well-being, animal liberation and animal rights (as well as environmental ethics) movements.

10th week:
Lecture: Psychiatric ethics/neuroethics. The different approaches to diseases. (What is a disease? What is normal?) How can we make a difference between medically normal and abnormal people? Introduction to philosophy of medicine.

11th week:
Lecture: The distinction between therapy and enhancement: one of the central topics of current bioethics (with a special emphasis on pharmacological ethics).

12th week:
Lecture: Ethical questions of current reproductive technologies. The ethics of abortion and infanticide. Where human life begins?

13th week:
Lecture: End-of-life decisions in current bioethics. Ethical questions concerning death, living will, transplantations, euthanasia, physician-assisted suicide and hospices. The right to die debate. Current neuroscience and bioethics.

14th week:
Lecture: The justice-principle. Questions about local and global justice in medicine (with special attention to pharmacological aspects). What does just allocation of constrained resources mean? Should we provide poor countries with expensive life-saving drugs? The effects of globalization on bioethics/pharmacological ethics.

Requirements

Attendance in the lectures is required. Usable understanding of the core theoretical concepts and conceptions is required as well as the knowledge on the actual patients’ rights regulation.
CHAPTER 20

ACADEMIC PROGRAM FOR THE 5TH YEAR

Department of Biopharmacy

Subject: BIOPHARMACY
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 28
Practical: 28

1st week:
Lecture: Fundamentals to biopharmacy.
Practical: Basic pharmacokinetic parameters.

2nd week:
Lecture: The LADMER system and its components.
Practical: Volume of Distribution, Clearance, Half-life.

3rd week:
Lecture: Liberation, absorption, distribution, metabolism, elimination, response.
Practical: One-compartment open model.

4th week:
Lecture: Drug release from the delivery system, bioavailability of the drug at the absorption site.
Practical: Continuous and intermittent drug delivery.

5th week:
Lecture: Drug clearance, hepatic drug elimination, renal drug elimination.
Practical: Equations, pharmacokinetic calculations.

6th week:
Lecture: Drug transport. Active and passive transport.
Practical: Equations, pharmacokinetic calculations II.

7th week:
Lecture: Type of drug delivery systems.
Practical: Equations, pharmacokinetic calculations III.

8th week:
Lecture: Biopharmacy of tables and capsules.
Practical: Equations, pharmacokinetic calculations IV.

9th week:
Lecture: Oral controlled release.
Practical: Equations, pharmacokinetic calculations V.

10th week:
Lecture: Delivering drugs by inhalation.
Practical: Equations, pharmacokinetic calculations VI.

11th week:
Lecture: Transdermal system.
Practical: Equations, pharmacokinetic calculations VII.

12th week:
Lecture: Time-programmed and patient-controlled drug delivery.
Practical: Equations, pharmacokinetic calculations VIII.

13th week:
Lecture: Smart drug delivery system and targeted therapy.
Practical: Equations, pharmacokinetic calculations IX.

14th week:
Lecture: Pharmaceutical biotechnology.
Practical: End of semester control test
Requirements

At least 30% of the lectures must be visited. Students have to write end of semester control test. If the result of the test will not be at least 60%, the students are not allowed to take oral exam. Absence of more than one practice is not allowed during the semester. Only students having adequately fulfilled the requirements of practice are allowed to get the signature and take the final oral exam.

Subject: PHARMACEUTICAL CARE
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 28

1st week:
Lecture: Pharmaceutical care (history, subject, theory, basic)

2nd week:
Lecture: Medication therapy management (subject, concept, theory)

3rd week:
Lecture: International pharmaceutical care protocols

4th week:
Lecture: Pharmaceutical care in Metabolic Syndrome

5th week:
Lecture: Diabetes prevention and pharm. care

6th week:
Lecture: Dyslipidemia and hypertension

7th week:
Lecture: Practice and theory of cholesterol, glucose, INR, and blood pressure measurement I.

8th week:
Lecture: Practice and theory of cholesterol, glucose, INR, and blood pressure measurement II.

9th week:
Lecture: Nutrition, diet and pharm. care I (theory, BMI, calculations, prevention, nutrition piramid)

10th week:
Lecture: Nutrition, diet and pharm. care II (special diet and nutrition, special diet in metabolic syndrome and in oncology patients)

11th week:
Lecture: Pharmaceutical care and it’s limitation (in cold, cough, flu, upper respiratory problems, fever, sunburn etc.)

12th week:
Lecture: Asthma, COPD and special inhalation medication.

13th week:
Lecture: Pharmaceutical care in reflux problems, heart burn, etc.

14th week:
Lecture: Pharm. care in hemostasis (coagulation, measurement etc.)

Requirements

At least 30% of the lectures must be visited. Only students having adequately fulfilled the requirements are allowed to get the signature and take the final exam.
Department of Clinical Pharmacology

Subject: **CLINICAL PHARMACOLOGY**
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 28

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture:</th>
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<tbody>
<tr>
<td>1st</td>
<td>Basic principles of Clinical Pharmacology.</td>
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<tr>
<td>2nd</td>
<td>Ethical and legal aspects.</td>
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<tr>
<td>3rd</td>
<td>The study phases (I-II).</td>
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<tr>
<td>4th</td>
<td>The study phases (III-IV).</td>
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<tr>
<td>5th</td>
<td>The clinical trial protocol.</td>
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<tr>
<td>6th</td>
<td>The GCP requirements in Clinical Pharmacology.</td>
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<tr>
<td>7th</td>
<td>Study Report (Clinical, Final).</td>
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<tr>
<td>8th</td>
<td>Statistical methods in Clinical Pharmacology.</td>
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<tr>
<td>9th</td>
<td>Quality Assurance in Clinical Pharmacology.</td>
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<tr>
<td>10th</td>
<td>Adverse events, serious adverse events, side effect.</td>
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<tr>
<td>11th</td>
<td>Patient Information and Informed Consent.</td>
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<tr>
<td>12th</td>
<td>Practical experience in an ongoing study.</td>
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<tr>
<td>13th</td>
<td>Visit of a pharmaceutical company.</td>
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</tbody>
</table>

Requirements

The aim of this course is to introduce the students into a rapidly developing and evolving subject. Clinical Pharmacology is not merely a link between Pharmacology and Clinical Medicine. The objective is to enhance the understanding of how drugs act and may be best used in the clinic, how compounds are transformed into drugs, how clinical trials are conducted.

Requirements of admission: after 4 years of pharmaceutical or medical studies

Speakers:
Miklós Bodor, M.D.,Ph.D., Associate Professor, Head of the Division of Clinical Pharmacology
Péter Kovács, M.D.,Ph.D.,Dsc, Professor in Pharmacology
Sándor Somodi, M.D.,Ph.D., Assistant Professor

Required infrastructure: lecture hall, library
Examination: oral and written
Literature: special papers and handbooks will be provided
CHAPTER 20

Department of Pharmaceutical Chemistry

Subject: QUALITY CONTROL
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 28

1st week:

2nd week:

3rd week:

4th week:
Lecture: Relationship between the elements of quality management, QA, GMP and QC. The GXP system for drug production and distribution. Good Pharmacy Practice (GPP). Philosophy, elements and directives of GPP. Guidelines for GPP requirements in practice.

5th week:
Lecture: The role of the GXP system during the life cycle of medicines and drug-candidates. The concept of Good Manufacturing Practice (GMP) requirements. Application of GMP: quality management.

6th week:
Lecture: Application of GMP: personnel aspects; premises and equipment.

7th week:
Lecture: Application of GMP: documentation.

8th week:

9th week:
Lecture: Application of GMP: contract manufacture and analysis; complaints and recalls; self-inspection. Validation: basic concepts of Good Validation Practice (GVP).

10th week:

11th week:

12th week:

13th week:

14th week:
Requirements

Within the pharmaceutical industry, quality is the key issue that has to be addressed above all others. It is the reason that so many regulations, guidelines and controls are important and applied. The course "Quality assurance" deals with quality in its widest sense, reviewing the International Standards Organization (ISO) series of standards, generic instruments such as Total Quality Management (TQM) and industry-specific topics like Good Manufacturing Practice (GMP). The conduct of pre-clinical and clinical studies of drug-candidates is controlled by a variety of regulations and guidelines known collectively as Good Laboratory Practice (GLP) and Good Clinical Practice (GCP), respectively. The assurance of safety and efficacy of pharmaceuticals from the time they leave the factory to the point at which they are used by the patient is the concept of Good Distribution Practice (GDP) and Good Pharmacy Practice (GPP), which latter is also essentially obliged to take care of patients under physician-controlled- and self-medication. Examination: written.

Department of Pharmaceutical Surveillance and Economics

Subject: CLINICAL PHARMACY
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 28
Seminar: 42

1st week:
Lecture: Introduction. The place of hospital and clinical pharmacy in the science. The hospital and clinical pharmacist’s place, role, task and relations within healthcare system. The place, task and role of hospital pharmacy in the medicine supply at a hospital. Regulations. Research and education in the field of hospital and clinical pharmacy.

Seminar: Documents on ward (patient’s record, file, charts, medication records, controlled drug records). Records in the hospital pharmacy.

2nd week:


3rd week:
Lecture: Therapeutic drug monitoring. The effects of medicines on the lab test findings. Changes of the lab findings due to medicine as an adverse drug reaction.

Seminar: Medical devices on ward.

4th week:
CHAPTER 20

Seminar: Paediatric pharmacy.

5th week:
Lecture: Basics of oncology. Oncology pharmacy.
Seminar: Oncology pharmacy 1: solid tumour and haematological malignancies.

6th week:
Seminar: Oncology pharmacy 2: adverse drug reaction management.

7th week:


8th week:
Lecture: Clinical nutrition.
Seminar: Clinical toxicology.

9th week:
Lecture: Gerontopharmacology. Beers criteria.
Seminar: Impaired organ functions and medicine use.

10th week:
Seminar: Adverse drug reactions, clinically relevant interactions, pharmacogenetics.

Requirements

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam. Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.

Subject: PHARMACOVIGILANCE
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 19
Seminar: 9

1st week:
Seminar: Roles and responsibilities: drug agencies, manufacturers and HCP.

2nd week:
Lecture: Definitions of medical and drug safety terminology. MEDRA coding, adverse drug reaction, ADR, AE, SAE, CIOMS. Discussion of selected examples.
Seminar: Reporting in practice: characterization of events.

3rd week:
Seminar: Examples of herbal- and food-drug interactions.
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<tr>
<th><strong>Week</strong></th>
<th><strong>Lecture</strong></th>
<th><strong>Seminar</strong></th>
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<tbody>
<tr>
<td>4th week</td>
<td>The clinical part II. Population based, genetic, gender, and age factors in drug safety, vulnerable populations.</td>
<td>Safety reporting in clinical practice Reports and results.</td>
</tr>
<tr>
<td>5th week</td>
<td>The EUDRA-Vigilance system for drug safety reporting. National and European guidelines.</td>
<td>Decision making tools and examples.</td>
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<tr>
<td>6th week</td>
<td>The process: safety reporting and process of Signal detection.</td>
<td>Risk management practice: risk factors, age, specific population, and other exogenous risk factors.</td>
</tr>
<tr>
<td>7th week</td>
<td>The theory: basics of Drug safety and Benefits/risk evaluation. Risk management and signal detection, statistical aspects. Discussion of selected examples.</td>
<td>Routine and additional risk minimization practices.</td>
</tr>
<tr>
<td>8th week</td>
<td>Drug safety in practice. Pharmacovigilance in practice: tools for pharmacists, physicians and for the patients. Consultation on selected topics.</td>
<td>Patient education: options and results. The role of pharmacists and the medical team in pharmacovigilance practice. Alerts and attention for specific data to collection.</td>
</tr>
<tr>
<td>9th week</td>
<td>Roles, responsibilities and participants of the national and EU pharmacovigilance systems. The implications on public health and economy.</td>
<td>Preparation for the drug safety presentation.</td>
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<tr>
<td>10th week</td>
<td>Consultation on selected topics in Pharmacovigilance.</td>
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**Requirements**

Concerning attendance of classes, the rules in the Regulations Governing Admission, Education and Examinations of the University of Debrecen are valid.

Conditions of signing the lecture book (by the end of semester): Participation in at least three (3) of the interim tests are required for the signature. The ones who failed will be required to pass the "end of semester test" in order to obtain signatures.

Exam (semifinal)
The exam will be written and oral exam at the end of the semester which covers all the topics of the semester taken in the lectures or seminars. Written part ( TEST (single choice, multiple choice, short description or definitions, etc.) and an Oral part (Two topics from selected list of questions provided.) Grade (semifinal mark) The average of the three scores (Test, Topic-1 Topic-2) compose the final mark ( 1-5 grades).

Exemption (full or partial) may be earned - only for those student who had at least 70%, can be eligible to submit an: I.) Oral presentation or a II.) Written assay of selected topics.
CHAPTER 20

Department of Pharmaceutical Technology

Subject: **DRUG INTERACTIONS THEORY**
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: **28**

**1st week:**
**Lecture:** Introduction, definitions. Basic principles. Pharmacokinetic and pharmacodynamic interactions.

**2nd week:**
**Lecture:** Biotransformation, pharmacogenetics. Vaccination related interactions.

**3rd week:**
**Lecture:** Antithrombotic therapy and its interactions.

**4th week:**
**Lecture:** Cancer management and drug interactions.

**5th week:**
**Lecture:** Diabetes treatment and it's drug interactions. Contraceptives' interactions.

**6th week:**
**Lecture:** Possible interactions during antibiotic therapy.

**7th week:**
**Lecture:** The role of alcohol in interactions. CNS drugs and interactions I.

**8th week:**
**Lecture:** CNS drugs and interactions II.

**9th week:**
**Lecture:** NSAIDs- drug interactions.

**10th week:**
**Lecture:** Interactions with sympathomimetics and antiasthmatics.

**11th week:**
**Lecture:** Cardiovascular drug interactions I.

**12th week:**
**Lecture:** Cardiovascular drug interactions II.

**13th week:**
**Lecture:** Consultation.

**14th week:**
**Lecture:** Consultation.

**Requirements**

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam. Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.

Subject: **PHARMACEUTICAL COMMUNICATION SKILLS**
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: **14**
Seminar: **4**
# ACADEMIC PROGRAM FOR THE 5TH YEAR

<table>
<thead>
<tr>
<th>1st week:</th>
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<tbody>
<tr>
<td><strong>Lecture:</strong> Verbal communication</td>
<td><strong>9th week:</strong></td>
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<tr>
<td><strong>Seminar:</strong> Verbal communication</td>
<td><strong>Lecture:</strong> Problem solving lectures based on different special situations.</td>
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<th>2nd week:</th>
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<tbody>
<tr>
<td><strong>Lecture:</strong> Verbal communication</td>
<td><strong>10th week:</strong></td>
</tr>
<tr>
<td><strong>Seminar:</strong> Verbal communication</td>
<td><strong>Lecture:</strong> Problem solving lectures based on different special situations.</td>
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<th>3rd week:</th>
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<tbody>
<tr>
<td><strong>Lecture:</strong> Non-verbal communication</td>
<td><strong>11th week:</strong></td>
</tr>
<tr>
<td><strong>Seminar:</strong> Non-verbal communication</td>
<td><strong>Lecture:</strong> Problem solving lectures based on different special situations.</td>
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<th>4th week:</th>
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<tbody>
<tr>
<td><strong>Lecture:</strong> Non-verbal communication</td>
<td><strong>12th week:</strong></td>
</tr>
<tr>
<td><strong>Seminar:</strong> Non-verbal communication</td>
<td><strong>Lecture:</strong> Problem solving lectures based on different special situations.</td>
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<th>5th week:</th>
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<tr>
<td><strong>Lecture:</strong> Metacommunication</td>
<td><strong>13th week:</strong></td>
</tr>
<tr>
<td><strong>Seminar:</strong> Metacommunication</td>
<td><strong>Lecture:</strong> Problem solving lectures based on different special situations.</td>
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<th>6th week:</th>
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<tbody>
<tr>
<td><strong>Lecture:</strong> Metacommunication</td>
<td><strong>14th week:</strong></td>
</tr>
<tr>
<td><strong>Seminar:</strong> Metacommunication</td>
<td><strong>Lecture:</strong> Test Self Control Test</td>
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<th>7th week:</th>
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<tbody>
<tr>
<td><strong>Lecture:</strong> Problem solving lectures based on different special situations.</td>
<td><strong>Requirements</strong></td>
</tr>
<tr>
<td></td>
<td>Attendance in the lectures is required.</td>
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<th>8th week:</th>
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<tbody>
<tr>
<td><strong>Lecture:</strong> Problem solving lectures based on different special situations.</td>
<td><strong>Division of Nuclear Medicine and Translational Imaging</strong></td>
</tr>
</tbody>
</table>

## Subject: RADIOPHARMACY PRACTICE

**Year, Semester:** 5th year/1st semester

**Number of teaching hours:**

**Practical:** 14

## Requirements

Practice: (i) main rules of radiation protection, (ii) activity calculation, (iii) gamma-spectrometry, (iv) iodine capsules and technetium generators, (v) visit in the PET centres, (vi) radio-HPLC methods.
CHAPTER 20

Subject: RADIOPHARMACY THEORY
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 14

1st week:
Lecture: Radionuclides and radioactive tracking in the living organs - nuclear medicine.

2nd week:
Lecture: Radiation properties of radionuclides for diagnosis and therapy. Dosimetry.

3rd week:
Lecture: In vivo radioisotope diagnostics in humans.

4th week:
Lecture: Radionuclide therapy as human treatment.

5th week:
Lecture: General methods of radioisotope manufacturing.

6th week:
Lecture: Radionuclide generators and applications.

7th week:
Lecture: Preparation of radiopharmaceuticals used in nuclear medicine, quality assurance, GMP

8th week:
Lecture: Advantage and disadvantages of radiopharmaceutical kit formulation. The Nuclear Pharmacy concept.

9th week:
Lecture: Preparation and use of radiopharmaceuticals with positron emitters (F-18, C-11, N-13, O-15).

10th week:
Lecture: Radioactive noble gases (Kr-81m, Xe-133) and I-123 as well as I-131 labelled radiopharmaceuticals.

11th week:
Lecture: Anionic Tc-99m complexes for renal, bone and hepatobiliar investigations.

12th week:
Lecture: Neutral and cationic Tc-99m complexes; brain and heart imaging. Preparation and use of Tc-99m labelled macromolecules and radio-colloids; blood cell labelling.

13th week:
Lecture: Other radioactive metals in diagnostic radiopharmaceuticals (Cr-51, Ga-67, In-111, Tl-201).

14th week:

Requirements
Radioactive tracers: types of radiations, radioisotope preparations, decay rows, generator systems, GMP productions. The Mo-99/Tc-99m generator and other generators.
Tc-99m radiopharmaceuticals: cationic, neutral and anionic complexes as well as colloids. Technetium labelling techniques. Ga-67/68, In-111 and Tl-201 radiopharmaceuticals. PET

(See also reading material, Gopal B. Saha: Fundamentals of Nuclear Pharmacy, Springer 2010, sixth edition)
DEENK Life Sciences Library

Subject: **LIBRARY SYSTEM**
Year, Semester: 1st year/1st semester
Number of teaching hours: Practical: 10

**1st week:**
**Practical:** Introduction to the Library and library use:
- Traditional services (registration, rules of library usage, loans, reading room, computer lab).
- Electronic services (the Library's home page, online catalogues).

**2nd week:**
**Practical:** Electronic Information Resources:
- Electronic journals.

**3rd week:**
**Practical:** Databases:
- Medline.
- Impact Factors.

**4th week:**
**Practical:** Databases

**5th week:**
**Practical:** Test

**Requirements**

The aim of the course:
The aim of this course is to acquire a basic theoretical and practical knowledge on library search systems and databases for an effective learning-research activity.

Course description:
The purpose of this course is to introduce students to the short history of the DEENK, its structure and regulations, and to present its services via the library’s own website.
Students will learn about the structure of the website, and get an overview of the most important menu items.
Students will also become familiar with the use of traditional and electronic library systems and services, databases, and the online catalogue.

PubMed: Students will learn about its structure, its role in scientific research activities, and the most important search methods and possibilities in online resources, health websites, and online journals.
Department of Applied Chemistry

Subject: PHARMACEUTICAL EXCIPIENTS
Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Lecture: 14

1st week:

2nd week:
Seminar: Basic chemical calculations.

3rd week:
Seminar: Introduction to Polymer Chemistry.

4th week:
Seminar: Polymeric excipients, general characterization.

5th week:
Seminar: General view of a medicine. Active ingredients, excipients, contaminants.

6th week:
Seminar: Consultation, problem solving.

7th week:
Seminar: Mid term test

8th week:
Seminar: Controlled drug release.

9th week:
Seminar: Fillers, solvents, emulsifiers.

10th week:
Seminar: Antioxidants, preservatives.

11th week:
Seminar: Aerosol propellants, colorants.

12th week:
Seminar: Materials for packaging.

13th week:

14th week:
Seminar: End-term test.

Requirements
The presence of students at the seminar is obligatory and will be recorded. If the student is absent from more than 4 seminars, the semester will not be accepted Evaluation is based on exam performance: mid-course and end-course written exams (50-50 %). Detailed information will be given in the first lecture.

Department of Biochemistry and Molecular Biology

Subject: MOLECULAR MECHANISM OF DISEASES OF GREAT POPULATIONS
Year, Semester: 3rd year/1st semester
Number of teaching hours:
Lecture: 25

1st week:
Lecture: Introduction to molecular medicine

2nd week:
Lecture: Genomic medicine
### Requirements

**Course content:** topics presented at the lectures (available at the website of the Department of Biochemistry and Molecular Biology,) Follow the link: Educational materials- Elective courses

**Attendance:**
Students are expected and required to attend all lectures of this course. No more than one unexcused absence is permitted. Students will fail the course on their second unexcused absence. Legitimate excuses should be presented in writing to the course administrator by the specified date.

**Grading policy:**
The final grade will be based on the final oral exam at the end of the semester. Students have to select one topic from the full list of course topics for their oral exam, and can sign up for the topic at the link below. The final sign-up sheet will be posted on the department web-site at the beginning of the exam period. **It will be your responsibility to contact the lecturer for the assignment, and for the date of the oral examination.** The course lecturers will assign scientific publications to the students based on the sign-up sheet. For the oral exam students are expected to prepare a short Powerpoint presentation (4-5 slides) based on the publication, and discuss the publication with the lecturer.

Please follow the announcements of the course administrator about exam dates or changes in the schedule on the bulletin board (LSB downstairs, 1st corridor), and on the department.

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### Department of Emergency Medicine

**Subject:** FIRST AID AND REANIMATION  
**Year, Semester:** 1st year/2nd semester  
**Number of teaching hours:**  
- Lecture: 7  
- Practical: 7

#### 1st week:
**Lecture:** The concept of first aid, first aid levels. Time Factor. The role of the scene. The usage of paramedics, rules of calling ambulance. ABCDE approach.

#### 2nd week:
**Lecture:** Concept and recognition of

3rd week:
Lecture: Organizational tasks at the site of the resuscitation. Prevention and solution of the complications of resuscitation. BLS. Effect, result, success in CPR. AED.

4th week:

5th week:
Lecture: Burning; first aid in burning diseases; shock. Intoxications. Ways of poison can enter the body. First aid of poisoning with corrosive and non-corrosive substances. Typical symptoms and recognition of common poisons.

6th week:
Seminar: Checking breathing and circulation. Ventilation without equipment. ABCDE approach.

7th week:
Practical: Practising ventilation without equipment.

8th week:
Practical: Practising chest compression.

9th week:
Practical: Cardiac arrest care simulation (BLS+AED)

Self Control Test

10th week:

Requirements

Condition of signing the Lecture book:
Attendance at practices is compulsory. The tutor may refuse to sign the Lecture book if the student is absent from the practicals more than twice in a semester. Missed practicals should be made up after consultation with the tutor. Facilities for a maximum of 2 make-up practicals are available at the Simulation Center in Debrecen. The current knowledge of students will be tested twice in each semester driving a written test.

Department of Inorganic and Analytical Chemistry

Subject: ENVIRONMENTAL ANALYTICAL CHEMISTRY
Year, Semester: 4th year/1st semester
Number of teaching hours:
Lecture: 42
Department of Pharmaceutical Chemistry

Subject: CHEMICAL BIOLOGY
Year, Semester: 3rd year/2nd semester
Number of teaching hours: Lecture: 14

1st week:
Lecture: Structure of proteins and polysaccharides.

2nd week:
Lecture: Structure of nucleic acids

3rd week:
Lecture: Structure of macromolecular lipides. Interactions determinating the structure of macrolecules.

4th week:
Lecture: Chemical synthesis of peptides and proteins.

5th week:
Lecture: Chemical synthesis of polysaccharides.

6th week:
Lecture: Chemical synthesis of nucleic acids

7th week:
Lecture: Molecular biology as a tool of chemical biology.

8th week:
Lecture: Methodologies of molecular biology

9th week:
Lecture: Electron spectroscopy and vibrational spectroscopy in chemical biology

10th week:
Lecture: Basics of NMR spectroscopy

11th week:

12th week:
Lecture: The molecular recognition.

13th week:
Lecture: Mass spectrometry in chemical biology.

14th week:
Lecture: Case studies of chemical biology.

Requirements
The aim of the course: to treat the fundamentals of modern analytical and synthetic methodologies that can be applied in biological research.

Requirements:
Good knowledge of basic organic chemistry.
Teaching material will be provided at the beginning of the course.

Subject: ILLICIT DRUGS
Year, Semester: 3rd year/1st semester
Number of teaching hours: Lecture: 28
REQUIRED ELECTIVE COURSES

1st week:
Lecture: Groups of drugs

2nd week:
Lecture: Designer drugs

3rd week:
Lecture: Synthetic drugs

4th week:
Lecture: Cannabis

5th week:
Lecture: THC

6th week:
Lecture: Opium

7th week:
Lecture: Morphine

8th week:
Lecture: Heroine

9th week:
Lecture: Therapy of opioid dependence

10th week:
Lecture: Coca plant

11th week:
Lecture: Cocaine

12th week:
Lecture: Psychedelic drugs

13th week:
Lecture: LSD

14th week:
Lecture: Other drugs

Department of Pharmaceutical Surveillance and Economics

Subject: INTRODUCTION TO FINANCIAL MANAGEMENT FOR PHARMACISTS
Year, Semester: 4th year/1st semester
Number of teaching hours:
Lecture: 12
Seminar: 5

1st week:
Lecture: Models and the key elements of microeconomy, specific aspects of a market on price related to product characteristics and demand.

2nd week:
Lecture: Consumer decisions. Management of an investment: costs and margins. Calculations of ROI and IRR.

3rd week:
Lecture: Model for macroeconomy. National and international relations of goods, price and investments.

4th week:

5th week:
Lecture: Business aspects of a Pharmacy operation. Management in a pharmacy. The concepts and the most important cost categories and definitions, P/L and the balance sheet.

6th week:
Lecture: The operation, financial aspects of a pharmacy as a business unit. Revenue, costs and cash/ flow.
CHAPTER 21

7th week:
Seminar: Elements of a Business plan and C/F plans.

8th week:
Seminar: Calculations of an investment, plan for business development, expected revenue and return of investment in a Business plan and C/F in practice.

Requirements

Concerning attendance of classes, the rules in the Regulations Governing Admission, Education and Examinations of the University of Debrecen are valid.
Participation in at least three (3) of 6 interim tests are required for the signature. Those ones who failed will be required to pass the "semifinal test" in order to obtain signatures.

Exam (semifinal, kollokvium)
The exam will be written and oral exam at the end of the semester which covers all the topics of the semester. Written part: Test and three topics from selected list of questions provided.
Grade (semifinal mark) The average of the three scores (Test, Topics) compose the final mark (1-5 grades).

Subject: INTRODUCTION TO PHARMACOECONOMY AND - EPIDEMIOLOGY
Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Lecture: 10
Seminar: 2

1st week:
Lecture: Introduction to Pharmacoepidemiology: The new concept and definitions, Study design, methodology, KAy parameters in epidemiology, Sample size, bias, confounding analysis.

2nd week:
Lecture: Drug utilization studies. Classification of outcome and exposure, Database and Data mining in practice.

3rd week:
Lecture: Measures of association, Population Attributable Risk

4th week:
Lecture: The analysis of "real life" data, assessments and trends based on big-datasets, by population

5th week:
Lecture: Systematic literature review, methodology of a metaanalysis

6th week:
Seminar: Practice of selected methodology

7th week:
Lecture: Quality of Life, questionnaires, VAS tests, validation

8th week:
Lecture: Cost of medicine, treatment, burden of diseases. Result, Efficacy and Efficiency

9th week:
Lecture: Cost of prevention in medicine, the results of changes in life-style

10th week:
Lecture: Health Technology Assessment:
rationale and theory

**11th week:**
**Lecture:** The practice of Cost-benefits (CBA) and Cost-utility (CUA) analysis, ICER

**12th week:**
**Seminar:** Calculations in practice: investments and cost of drug development

**Requirements**

Concerning attendance of classes, the rules in the Regulations Governing Admission, Education and Examinations of the University of Debrecen are valid.

Participation in at least three (3) out of the 2 tests and two (2) practices are required for the signature. Those ones who failed will be required to pass the "semifinal test" in order to obtain signatures.

The exam will be written and oral exam at the end of the semester which covers all the topics of the semester. Written part: Test and two topics from selected list of questions.

Grade (semifinal mark) The average of the three scores (1x Test, 2x Topics) compose the final mark (1-5 final grade).

**Department of Pharmaceutical Technology**

**Subject:** BIOCOSMETICS

**Year, Semester:** 2nd year/1st semester

**Number of teaching hours:**

**Lecture:** 14

**1st week:**
**Lecture:** History of cosmetics I.

**2nd week:**
**Lecture:** History of cosmetics II.

**3rd week:**
**Lecture:** History of cosmetics III.

**4th week:**
**Lecture:** Biocosmetics, theory

**5th week:**
**Lecture:** Basic skin types.

**6th week:**
**Lecture:** Cosmetic changes on skin I.

**7th week:**
**Lecture:** Cosmetic changes on skin II.

**8th week:**
**Lecture:** Therapy of seborrhoea.

**9th week:**
**Lecture:** Decor cosmetics I.

**10th week:**
**Lecture:** Decor cosmetics II.

**11th week:**
**Lecture:** Tooth and mouth care.

**12th week:**
**Lecture:**Cosmetics preparations I.

**13th week:**
**Lecture:**Cosmetics preparations II.

**14th week:**
**Lecture:** Consultation
CHAPTER 21

Requirements

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam.

Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.

Subject: **DIETARY SUPPLEMENTS AND GENERAL NUTRIENTS**  
Year, Semester: 4th year/2nd semester  
Number of teaching hours:  
Lecture: 28

Subject: **GALENIC PREPARATIONS**  
Year, Semester: 5th year/1st semester  
Number of teaching hours:  
Lecture: 28

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<tr>
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<td><strong>Lecture:</strong> Ointments</td>
<td><strong>Lecture:</strong> Official prescriptions 10-15</td>
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<tr>
<td><strong>Lecture:</strong> Solutions</td>
<td><strong>Lecture:</strong> Official prescriptions 15-20</td>
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<td><strong>Lecture:</strong> Official prescriptions 20-25</td>
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<td><strong>Lecture:</strong> Official prescriptions 25-30</td>
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<td><strong>Lecture:</strong> Official prescriptions 30-35</td>
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<td><strong>Lecture:</strong> Official prescriptions 5-10</td>
<td><strong>Lecture:</strong> Official prescriptions 35-40, Consultation</td>
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Requirements

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam.

Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.
REQUIRED ELECTIVE COURSES

Subject: **INDUSTRIAL PHARMACEUTICAL PRACTICE**
Year, Semester: 5th year/1st semester
Number of teaching hours:
Practical: 28

Subject: **JURISTIC KNOWLEDGE FOR PHARMACISTS**
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 14

1st week:
**Lecture:** Introduction to Law – Norms, Mores and Folkways, Defining Law

2nd week:
**Lecture:** Families of Law, Functions of Law, Classification of Law

3rd week:
**Lecture:** Sources of Law, Principles for resolve conflicts of Law

4th week:
**Lecture:** Interpretation of Law, Dispute resolution

5th week:
**Lecture:** Law and Ethics in Pharmacy I. – The rights of the patient

6th week:
**Lecture:** Law and Ethics in Pharmacy II. – Moral principles in medical practice, Ethical Codes for Pharmacists

7th week:
**Lecture:** Health and Pharmaceutical Care, The 7 Star Pharmacist

8th week:
**Lecture:** The Good Pharmacy Practice

9th week:
**Lecture:** Pharmaceutical Legislation

10th week:
**Lecture:** International Health Organisations

11th week:
**Lecture:** Global Health Law I.

12th week:
**Lecture:** Global Health Law II.

13th week:
**Lecture:** Case Studies (Patient Rights, Ethics)

14th week:
**Lecture:** consultation

**Requirements**

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam. Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.
## CHAPTER 21

Subject: **NANOPHARMACEUTICS**  
Year, Semester: 4th year/1st semester  
Number of teaching hours: 14  

1st week:  
**Lecture:** Introduction. Nanotechnology and Nanomedicine  

2nd week:  
**Lecture:** Investigation methods of nanotechnology and nanopharmaceutics.  

3rd week:  
**Lecture:** Nano-sized drug delivery systems 1. Liposomes.  

4th week:  
**Lecture:** Nano-sized drug delivery systems 2. Nanoparticles and nanotubes.  

5th week:  
**Lecture:** Nano-sized drug delivery systems 3. Unimolecular polymer and dendrimer conjugates.  

6th week:  
**Lecture:** Nano-sized drug delivery systems 4. Micellar systems, polymer micelles.  

7th week:  
**Lecture:** Nano-sized drug delivery systems 5. Antibodies and their conjugates.  

8th week:  
**Lecture:** Nano-sized drug delivery systems 6. Cyclodextrins.  

9th week:  
**Lecture:** Nano-sized drug delivery systems 7. Vectors for nucleic acid drug delivery.  

10th week:  
**Lecture:** Theranostics.  

11th week:  
**Lecture:** Pharmacokinetics and toxicology of nanopharmaceutics.  

12th week:  
**Lecture:** Interaction of nanopharmaceutics and biological barriers. Cellular internalization and intracellular behaviour of nanopharmaceutics.  

13th week:  
**Lecture:** Nanopharmaceutics: drugs in the therapy.  

14th week:  
**Lecture:** Consultation.  

### Requirements

Written test

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Subject: **NUTRITIONAL THERAPY**  
Year, Semester: 4th year/1st semester  
Number of teaching hours: 14

1st week:  
**Lecture:** Introduction. Digestive and absorption problem of nutrients. Pathological definitions.  

2nd week:  
**Lecture:** Nutrition of newborns and infants.  

3rd week:  
**Lecture:** Type and composition of infant nutrition.  

Metabolism and absorption disturbances.
REQUIRED ELECTIVE COURSES

4th week:
Lecture: Classification of artificial nutrition. Percutan Endoscopic Gastrostomy.

5th week:
Lecture: Classification and composition of enteral nutrition products. Manufacturing requirements and release.

6th week:
Lecture: Determination of energy demand and nutrient requirement. Practice of Glicemic Index.

7th week:
Lecture: Fluid and electrolyte therapy. Rehydration in hospital and home.

8th week:
Lecture: Accessories and type of parenteral nutrition therapy.

9th week:
Lecture: Preparation of parenteral nutrition therapy.

10th week:

11th week:
Lecture: Lipid intake aspects.

12th week:
Lecture: Protein intake aspects. Food allergy and food intolerance.

13th week:
Lecture: Vitamins and trace elements intake aspects.

14th week:
Lecture: Practice of enteral nutrition by other way. Cooking in the kitchen of Dietetic Service at Clinical Center.

Requirements

Written test

Subject: OPERATING SYSTEM OF THE PHARMACEUTICAL INDUSTRY
Year, Semester: 5th year/1st semester
Number of teaching hours: Lecture: 14

1st week:
Lecture: Pharmaceutical quality system I.

2nd week:
Lecture: Pharmaceutical quality system II.

3rd week:
Lecture: Pharmaceutical industry and patent systems I.

4th week:
Lecture: Pharmaceutical industry and patent systems II.

5th week:
Lecture: CGMPS and the concepts of modern quality systems I.

6th week:
Lecture: CGMPS and the concepts of modern quality systems II.

7th week:
Lecture: Pharmaceutical computer systems I.

8th week:
Lecture: Pharmaceutical computer systems II.

9th week:
Lecture: Pharmaceutical GMP regulations I.

10th week:
**CHAPTER 21**

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<tr>
<th>Lecture</th>
<th>11th week: Pharmaceutical GMP regulations II.</th>
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<tr>
<td>Lecture</td>
<td>12th week: Generics I.</td>
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<td>Lecture</td>
<td>13th week: Marketing</td>
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<td>Lecture</td>
<td>14th week: Consultation</td>
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</table>

**Requirements**

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam. Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.

**Subject: PHARMACEUTICAL COMPUTER ADMINISTRATION**

Year, Semester: 4th year/2nd semester

Number of teaching hours:
Lecture: 28

<table>
<thead>
<tr>
<th>1st week:</th>
<th>9th week: Ordering program on computer (in pharmacy) I.</th>
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<tr>
<td>Lecture:</td>
<td>2nd week: Computer knowledge.</td>
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<td>Lecture:</td>
<td>3rd week: Computer programs I.</td>
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<td>Lecture:</td>
<td>4th week: Computer programs II.</td>
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<td>Lecture:</td>
<td>5th week: Computer programs in pharmacy I.</td>
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<td>Lecture:</td>
<td>6th week: Computer programs in pharmacy II.</td>
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<td>Lecture:</td>
<td>11th week: Ordering program on computer (in pharmacy) III.</td>
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<td>Lecture:</td>
<td>12th week: Administration on computer I.</td>
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<tr>
<td>Lecture:</td>
<td>13th week: Administration on computer II.</td>
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<tr>
<td>Lecture:</td>
<td>14th week: Consultation.</td>
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**Requirements**

Attendance of practicals is obligatory. Altogether two absences in the semester is permitted. After absence the practical should be made up. At the end of the semester students get 5-stage practical grade.

Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.
Required Elective Courses

the student is absent from the practicals more than allowed in a semester

Subject: **STATE EXAM PRACTICE I. PHARMACY DISPENSING**
Year, Semester: 5th year/1st semester
Number of teaching hours:
Practical: **120**

1st week:
**Lecture:** Theoretical and practical knowledge of registered drug preparations, galenicals, magistral preparations, pharmaceutical preparations.

2nd week:
**Lecture:** individual prescriptions

3rd week:
**Lecture:** dosage forms.

4th week:
**Lecture:** the theoretical and practical knowledge of vaccines, immunosera, and sutures for human and veterinary use

5th week:
**Lecture:** The basic knowledge of medical aid products, equipments and machines for

6th week:
**Lecture:** Basic knowledge of pharmacy management,

7th week:
**Lecture:** pharmaceutical affairs organizations and juristic knowledge for pharmacists. Pharmacy organizations.

8th week:
**Lecture:** Knowledge of measurement conversion and the International System of Units (SI). Basic knowledge of biopharmacy, pharmacology and pharmacognosy. Control of pharmaceutical preparations.

Requirements

**Syllabus for the practice in a public pharmacy before final examination**

Duration of the practice is 2+4 months, 8 hours daily, from which two hours may be spent on preparing individually. Pharmacy students should gain experience on the following areas in a general pharmacy during their practice and subsequently acquire knowledge about pharmacy operation including: dispensing medication, preparing medication, validation and quality assurance, and the overall operation of the pharmacy.

Requirements for the student:
Accept and sign the non-disclosure document. Absence from practice must be authentically justified based on the rules of the place of training. Absences must be made up. He/she is expected to follow the guidance of the pharmacist in charge of the training.

The expected skills made on the student after completion of the practice:
• practical application of the theoretical knowledge obtained during his / her studies,
• the knowledge of the practical application of the rules and regulations concerning the operation of pharmacies,
• he / she is required to have an appropriate working relationship with the co-workers at the pharmacy
• he/ she is expected to communicate with the patients in an appropriate way,
• he / she is required to appropriately inform and give advice in connection with the patients’
questions regarding self-healing and preparations without prescription (drugs and other products),
• He/she is required to identify „problematic patients” from the point of view of communication
and to handle situations properly with help.

The student’s tasks during the practice:
Under the supervision and instructions of the pharmacist in charge of the training he/she participates in the following activities:

1. Drug Dispense. In the process he/she is required to learn:
• how to check the content and layout of the prescription
• the application of the rules regarding the replacement of drugs, ordering of drugs on the basis of international non-proprietary name,
• appropriate patient information knowing the effects and adverse effects of drugs,
• recognition and evaluation of the characteristic interactions based on database (drug-drug, drug-food, drug-food supplement),
• characteristic/obligatory cases and methods of medical information and consultation,
• duties in connection with the known/identified adverse effects of drugs,
• adherence control and means of correction, common uses,
• the typical cases of self-healing, the dispensing of the preparations without prescription that can be applied for this purpose,
• the possibilities and rules of access to data regarding the patients’ previous medication (OEP database),
• the database of nutrition complements and medicinal formulae
• proper application of the labelling and dispensing computer program.

2. Preparation of medicine. In the process he/she is required to learn:
• How to prepare magistral/individual formulations according to the rules and to recognize incompatibilities
• The legal possibilities of changing the original prescription
• The rules of labelling and their application (identifiability of manufacturer and patient, application, administration, shelf-life)
• Documentation of preparation, and administrative obligations
• Storage of materials, processing of basic formulations and subsequent administrative obligations
• Formulations of the compendium and FoNo

3. Operation, quality assurance. In the process he/she is required to learn:
• administrative work in the pharmacy
• the rules concerning the staff of the pharmacy; qualification, labor law requirements,
• standard procedures for workflow
• how to check and document workflow
• the rules pertaining to the examining and sampling incoming medications,
• documentation of examinations

4. Medication management. In the process he/she is required to learn:
• aspects of inventory management,
• how to order medicine
• duties in case of waste products, returned items, damage,
• withdrawal of products from circulation,

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REQUIRED ELECTIVE COURSES

• duties regarding shift of prices,
• closings: daily, weekly, periodic as well as schedule of OEP reports,
• importance and practice of supervision of prescriptions,
• about narcotics and activities involving their handling,
• the rules pertaining to hazardous waste.

Evaluation:
Keeping an electronic workbook: the description of two practical problems in half/one page weekly. One of them should describe a question related to the patient (dispensing drugs), the other topic can be chosen from the three other areas (preparation of medicine, operation, medication management). The descriptions made during the practice should be concerned with all the areas of the activities at a pharmacy. The pharmacist in charge of the training checks the work and description every week and evaluates it using a five-grade system. He / She sends the electronic notebook to the Dean’s Office according to the rules of the place of training. The student is required to make a 10-15-minute-long presentation for the co-workers of the pharmacy from a professional scientific journal recommended by the pharmacist in charge of the training (the documentation of which will be kept in the workbook) on one occasion. The presentation will take place on a date agreed on by the training location and the student. At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place. Student evaluation: After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.

Subject: STATE EXAM PRACTICE I. PRESCRIPTION PHARMACY
Year, Semester: 5th year/1st semester
Number of teaching hours: Practical: 120

Requirements
Duration of the practice is 2+4 months, 8 hours daily, from which two hours may be spent on preparing individually. Pharmacy students should gain experience on the following areas in a general pharmacy during their practice and subsequently acquire knowledge about pharmacy operation including: dispensing medication, preparing medication, validation and quality assurance, and the overall operation of the pharmacy.
Accept and sign the non-disclosure document.
Absence from practice must be authentically justified based on the rules of the place of training. Absences must be made up.
He/she is expected to follow the guidance of the pharmacist in charge of the training.
practical application of the theoretical knowledge obtained during his / her studies,
the knowledge of the practical application of the rules and regulations concerning the operation of pharmacies,
he / she is required to have an appropriate working relationship with the co-workers at the pharmacy
he/ she is expected to communicate with the patients in an appropriate way,
he / she is required to appropriately inform and give advice in connection with the patients’ questions regarding self-healing and preparations without prescription (drugs and other products),
he/she is required to identify „problematic patients” from the point of view of communication and to handle situations properly with help.

Under the supervision and instructions of the pharmacist in charge of the training he/she the following activities:

1. Drug Dispense. In the process he/she is required to learn:
   - how to check the content and layout of the prescription
   - the application of the rules regarding the replacement of drugs, ordering of drugs on the basis of international non-proprietary name,
   - appropriate patient information knowing the effects and adverse effects of drugs,
   - recognition and evaluation of the characteristic interactions based on database (drug-drug, drug-food, drug-food supplement),
   - characteristic/obligatory cases and methods of medical information and consultation,
   - duties in connection with the known/identified adverse effects of drugs,
   - adherence control and means of correction, common uses,
   - the typical cases of self-healing, the dispensing of the preparations without prescription that can be applied for this purpose,
   - the possibilities and rules of access to data regarding the patients’ previous medication (OEP database),
   - the database of nutrition complements and medicinal formulae
   - proper application of the labelling and dispensing computer program.

2. Preparation of medicine. In the process he/she is required to learn:
   - How to prepare magistral/individual formulations according to the rules and to recognize incompatibilities
   - The legal possibilities of changing the original prescription
   - The rules of labelling and their application (identifiability of manufacturer and patient, application, administration, shelf-life)
   - Documentation of preparation, and administrative obligations
   - Storage of materials, processing of basic formulations and subsequent administrative obligations
   - Formulations of the compendium and FoNo

3. Operation, quality assurance. In the process he/she is required to learn:
   - administrative work in the pharmacy
   - the rules concerning the staff of the pharmacy; qualification, labor law requirements,
   - standard procedures for workflow
   - how to check and document workflow
   - the rules pertaining to the examining and sampling incoming medications,
   - documentation of examinations

4. Medication management. In the process he/she is required to learn:
   - aspects of inventory management,
   - how to order medicine
   - duties in case of waste products, returned items, damage,
   - withdrawal of products from circulation,
   - duties regarding shift of prices,
   - closings: daily, weekly, periodic as well as schedule of OEP reports,
   - importance and practice of supervision of prescriptions,
   - about narcotics and activities involving their handling.
the rules pertaining to hazardous waste.

Keeping an electronic workbook: the description of two practical problems in half/one page weekly. One of them should describe a question related to the patient (dispensing drugs), the other topic can be chosen from the three other areas (preparation of medicine, operation, medication management). The descriptions made during the practice should be concerned with all the areas of the activities at a pharmacy. The pharmacist in charge of the training checks the work and description every week and evaluates it using a five-grade system. He / She sends the electronic notebook to the Dean’s Office according to the rules of the place of training.

The student is required to make a 10-15-minute-long presentation for the co-workers of the pharmacy from a professional scientific journal recommended by the pharmacist in charge of the training (the documentation of which will be kept in the workbook) on one occasion. The presentation will take place on a date agreed on by the training location and the student.

At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place.

After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.

Subject: STATE EXAM PRACTICE II. – PHARMACEUTICAL MANAGEMENT, QUALITY ASSURANCE
Year, Semester: 5th year/2nd semester
Number of teaching hours:
Practical: 60

Subject: STATE EXAM PRACTICE II. (PHARMACEUTICAL BUSINESS ADMINISTRATION)
Year, Semester: 5th year/2nd semester
Number of teaching hours:
Practical: 60

Subject: STATE EXAM PRACTICE II. INSTITUTIONAL PHARMACY OR GALENIC LABORATORY
Year, Semester: 5th year/2nd semester
Number of teaching hours:
Practical: 120

Requirements

Duration of the practice is 2+4 months, 8 hours daily, from which two hours may be spent on preparing individually.
Pharmacy students should gain experience on the following areas in a general pharmacy during
their practice and subsequently acquire knowledge about pharmacy operation including: dispensing medication, preparing medication, validation and quality assurance, and the overall operation of the pharmacy.

Accept and sign the non-disclosure document.
Absence from practice must be authentically justified based on the rules of the place of training. Absences must be made up.
He/she is expected to follow the guidance of the pharmacist in charge of the training.
the practical application of the theoretical knowledge obtained during his / her studies,
the knowledge of the practical application of the rules and regulations concerning the operation of pharmacies,
he / she is required to have an appropriate working relationship with the co-workers at the pharmacy
he/ she is expected to communicate with the patients in an appropriate way,
he / she is required to appropriately inform and give advice in connection with the patients’
questions regarding self-healing and preparations without prescription (drugs and other products),
He / she is required to identify „problematic patients” from the point of view of communication and
to handle situations properly with help.

Under the supervision and instructions of the pharmacist in charge of the training he / she the following activities:
1. Drug Dispense. In the process he / she is required to learn:
how to check the content and layout of the prescription
the application of the rules regarding the replacement of drugs, ordering of drugs on the basis of international non-proprietary name,
appropriate patient information knowing the effects and adverse effects of drugs,
recognition and evaluation of the characteristic interactions based on database (drug-drug, drug-food, drug-food supplement),
characteristic/obligatory cases and methods of medical information and consultation,
duties in connection with the known/identified adverse effects of drugs,
adherence control and means of correction, common uses,
the typical cases of self-healing, the dispensing of the preparations without prescription that can be applied for this purpose,
the possibilities and rules of access to data regarding the patients’ previous medication (OEP database),
the database of nutrition complements and medicinal formulae
proper application of the labelling and dispensing computer program.
2. Preparation of medicine. In the process he / she is required to learn:
How to prepare magistral / individual formulations according to the rules and to recognize incompatibilities
The legal possibilities of changing the original prescription
The rules of labelling and their application (identifiability of manufacturer and patient, application, administration, shelf-life)
Documentation of preparation, and administrative obligations
Storage of materials, processing of basic formulations and subsequent administrative obligations
Formulations of the compendium and FoNo
3. Operation, quality assurance. In the process he / she is required to learn:
administrative work in the pharmacy
the rules concerning the staff of the pharmacy; qualification, labor law requirements,
standard procedures for workflow
how to check and document workflow
the rules pertaining to the examining and sampling incoming medications,
documentation of examinations

4. Medication management. In the process he / she is required to learn:
aspects of inventory management,
how to order medicine
duties in case of waste products, returned items, damage,
withdrawal of products from circulation,
duties regarding shift of prices,
closings: daily, weekly, periodic as well as schedule of OEP reports,
importance and practice of supervision of prescriptions,
about narcotics and activities involving their handling,
the rules pertaining to hazardous waste.

Keeping an electronic workbook: the description of two practical problems in half/one page weekly. One of them should describe a question related to the patient (dispensing drugs), the other topic can be chosen from the three other areas (preparation of medicine, operation, medication management). The descriptions made during the practice should be concerned with all the areas of the activities at a pharmacy. The pharmacist in charge of the training checks the work and description every week and evaluates it using a five-grade system. He / She sends the electronic notebook to the Dean’s Office according to the rules of the place of training.
The student is required to make a 10-15-minute-long presentation for the co-workers of the pharmacy from a professional scientific journal recommended by the pharmacist in charge of the training (the documentation of which will be kept in the workbook) on one occasion. The presentation will take place on a date agreed on by the training location and the student.
At the end of the practice the pharmacist in charge of the training evaluates the student’s overall practical work on an assessment sheet in written form and evaluates the student based on a three-grade system. He / she sends it to the Dean’s Office in a printed and signed form according to the rules of the training place.

After the practice the student fills in a questionnaire pertaining to the training place and the pharmacist in charge of the training according to the rules of the training facility.

Subject: **STATE EXAM PRACTICE II. PHARMACY DISPENSING**
Year, Semester: 5th year/2nd semester
Number of teaching hours: Practical: **120**

Subject: **STATE EXAM PRACTICE II. PRESCRIPTION PHARMACY**
Year, Semester: 5th year/2nd semester
Number of teaching hours: Practical: **120**

1st week:
Lecture: Technical books of pharmacy. (H.Ph. VII., H.Ph.VIII., Eur. Ph. 7., FoNoVII. )
2nd week:  
**Lecture:** Nomenclature,

3rd week:  
**Lecture:** reading of prescriptions

4th week:  
**Lecture:** materials knowledge

5th week:  
**Lecture:** calculations

6th week:  
**Lecture:** computer program.

7th week:  
**Lecture:** Theoretical and practical knowledge of registered drug preparations

8th week:  
**Lecture:** Basic knowledge of pharmacy management, pharmaceutical affairs organizations and juristic knowledge for pharmacists.

9th week:  
**Lecture:** Pharmacy organizations.

10th week:  
**Lecture:** The basic knowledge of medical aid products, equipments and machines for pharmaceutical preparations.

11th week:  
**Lecture:** the theoretical and practical knowledge of vaccines, immunosera, and sutures for human and veterinary use.

12th week:  
**Lecture:** Consultation

13th week:  
**Lecture:** The students need to practice the medium scale pharmaceutical technology operations.

14th week:  
**Lecture:** Equipments and machines for medium scale pharmaceutical technology operations.

Subject: **SYNTHETIC CHEMISTRY PRACTICE**  
Year, Semester: 5th year/1st semester  
Number of teaching hours:  
Practical: **28**

Subject: **THESIS**  
Year, Semester: 5th year/2nd semester  
Number of teaching hours:  
Practical: **28**

Subject: **THESIS CONSULTATION**  
Year, Semester: 5th year/1st semester  
Number of teaching hours:  
Practical: **28**
REQUIRED ELECTIVE COURSES

Subject: TOXICOLOGY
Year, Semester: 5th year/1st semester
Number of teaching hours:
Practical: 28

1st week:
Lecture: 1. Introduce pharmacy rooms. Division of pharmacy, instruments, equipments. 2. Storage of drug preparations, requirements. chemical substances, drugs, galenicals, registered preparations, drugs with strong effect, Study those chemicals studied at the University, materials knowledge, nomenclature. 3. Reading of Prescriptions, pharmaceutical Latin.

2nd week:
Lecture: 4. Instruments used in Pharmacy, pharmacy balances, small equipments etc. description, cleaning, maintenance. 5. Requirements for packaging of pharmaceutical preparations. Choosing the suitable containers.

3rd week:
Lecture: 6. Simple processes of pharmaceutical technology (measuring, sieving, mixing of powders, dilution, concentration calculation of solutions, other simple calculations needed for pharmaceutical work. 7. Technical books of pharmacy. (H.Ph. VII., H.Ph.VIII., Eur. Ph. 7., FoNoVII.)

4th week:
Lecture: 8. Tests, investigations according to the Eur. Ph. 7. 9. Connection with patients. Take part in pharmacy dispensing.

Subject: VETERINARY HYGIENE
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 28

1st week:
Lecture: Basics of veterinary hygiene I.

2nd week:
Lecture: Basics of veterinary hygiene II.

3rd week:
Lecture: Basics of veterinary hygiene III.

4th week:
Lecture: Basics of veterinary hygiene IV.

5th week:
Lecture: Formule Normales Veterinariae III

6th week:
Lecture: Preparations from Formule Normales Veterinariae III

9th week:
Lecture: Veterinary illness and therapy I.

10th week:
Lecture: Veterinary illness and therapy II.

11th week:
Lecture: Veterinary illness and therapy III.

12th week:
Lecture: Test

13th week:
Lecture: Zoonosis-animal diseases transmissible to humans

14th week:
Lecture: Zoonosis-animal diseases transmissible to humans II.
CHAPTER 21

Requirements

Students have to attend 30% of the lectures. All materials covered in lectures is an integral part of the subject and therefore included in the self-control test and the final exam. Requirements for signing the Lecture book: The Department may refuse to sign the lecture book if the student didn’t attend 30% of lectures.

Department of Pharmacology

Subject: PHYTOPHARMACOLOGY
Year, Semester: 5th year/1st semester
Number of teaching hours:
Lecture: 24

Requirements

Attendance at 50% of lectures is a requirement for acceptance of the semester. Before the end of the semester students have to take a written exam. Requirement on this written exam is at least 60% for the signature of the Lecture Book for the semester and for the student to be allowed to take the End of Semester Exam (ESE). At the end of the semester students take End of Semester Exam (ESE) which is oral. During the semester there is an opportunity to be freed from the constraint of the End of Semester Exam. Students are offered the grade of the written exam passed during the semester if it is at least good (80%) or excellent (90%). Correction of the offered grade is in the form of taking the oral End of Semester Exam instead. The result of the exam can be better or even worse than the offered grade.

Department of Physical Chemistry

Subject: POLYMORPHISM OF PHARMACEUTICALS
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 28

1st week:

2nd week:

3rd week:

4th week:

5th week:
Lecture: Computational chemistry. Polymorph prediction.

6th week:
### REQUIRED ELECTIVE COURSES

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td><strong>Lecture</strong>: Single crystal X-ray diffraction. Structure of polymorphs. The hydrogen bond.</td>
</tr>
<tr>
<td>8th</td>
<td><strong>Lecture</strong>: Ab initio structure determination from powder diffraction data. Indexing, Rietveld refinement.</td>
</tr>
<tr>
<td>9th</td>
<td><strong>Lecture</strong>: Solid state NMR basics. ssNMR in polymorph research.</td>
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<tr>
<td>10th</td>
<td><strong>Lecture</strong>: FT-IR and Raman spectroscopy and microscopy. ATR techniques.</td>
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<tr>
<td>11th</td>
<td><strong>Lecture</strong>: Polymorphism - quality control issues</td>
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<tr>
<td>12th</td>
<td><strong>Lecture</strong>: Polymorphism of dyes and explosives.</td>
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<tr>
<td>13th</td>
<td><strong>Lecture</strong>: Crystallographic databases. CSD, polymorph structures in the Database.</td>
</tr>
<tr>
<td>14th</td>
<td><strong>Lecture</strong>: Regulatory questions of polymorphism. FDA, ICH, EMEA rules, Q6A. Case studies. Polymorphism of chocolate</td>
</tr>
</tbody>
</table>

### Requirements

Entrance conditions: successful final exam on Pharmaceutical technology II., at least 5 students

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**Department of Physiology**

**Subject**: MODERN TECHNIQUES ALLOWING THE INVESTIGATION OF PHYSIOLOGICAL PHENOMENA

Year, Semester: 2nd year/2nd semester  
Number of teaching hours:  
Lecture: **20**

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td><strong>Lecture</strong>: Application of electrophysiological techniques in the investigation of the electric activities of living cells.</td>
</tr>
<tr>
<td>2nd</td>
<td><strong>Lecture</strong>: Methods allowing the monitoring of the intracellular Ca2+ concentration in living cells.</td>
</tr>
<tr>
<td>3rd</td>
<td><strong>Lecture</strong>: Analysis, evaluation and interpretation of current recordings. Biostatistics.</td>
</tr>
<tr>
<td>4th</td>
<td><strong>Lecture</strong>: Preparation of neurones for functional investigation. Possible advantages and disadvantages of the applicable methods.</td>
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<tr>
<td>5th</td>
<td><strong>Lecture</strong>: Investigation of the signal transducing proteins at the levels of proteins, RNA or DNA (immunocytochemistry, immunohistochemistry, confocal microscopy, Western blot, quantitative [real-time] PCR).</td>
</tr>
<tr>
<td>6th</td>
<td><strong>Lecture</strong>: Cell and tissue culture (primary cultures, cell lines, organ cultures).</td>
</tr>
<tr>
<td>7th</td>
<td><strong>Lecture</strong>: Isolation and identification of contractile proteins by biochemical methods.</td>
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<tr>
<td>8th</td>
<td><strong>Lecture</strong>: Measurements conducted on isolated ion channels: the bilayer technique.</td>
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<tr>
<td>9th</td>
<td></td>
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</tbody>
</table>
Requirements

1. Signature of the semester
Lecture attendance may be followed up by the Department. The lecture will not be delivered if 5 or fewer students show up. Nevertheless, the lecture material is going to be asked in the final assessment.
For continuous updates on all education-related matters, please check the elearning.med.unideb.hu website (Department of Physiology menu item).

2. Evaluation during the semester
None.

3. Examination
At the end of the course a written final assessment will be organized in the form of multiple choice questions.
The result of this assessment will determine the verification mark of the credit course using the following conversion table:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-39.9 %</td>
<td>Failed</td>
</tr>
<tr>
<td>40-54.9 %</td>
<td>Pass</td>
</tr>
<tr>
<td>55-69.9 %</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>70-84.9 %</td>
<td>Good</td>
</tr>
<tr>
<td>85-100 %</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

Subject: PROBLEM BASED LEARNING IN PHYSIOLOGY
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Practical: 28

1st week: The practices are listed at the web site (Department of Physiology menu item).

Requirements

1. Signature of the semester
This is an individual project oriented program. The signature of the semester may be refused if the project report is not submitted before to the deadline.

2. Evaluation during the semester
No mid-semester evaluation.

3. Examination
290
The evaluation is based on the project report submitted before the deadline. For specifics, see the rules below and consult with the elearning.med.unideb.hu web site (Department of Physiology menu item).

Aims of the course: The program offers carefully selected and designed problems from the field of Physiology. Students can learn how to apply problem solving approach, self-conducted strategy and analytic thinking in resolving selected problems. Skill in team-work is helpful in the program.

RULES FOR THE PROBLEM BASED LEARNING (PBL) CREDIT COURSE

1. The program is conducted between 3rd and 11th academic weeks of the second semester.
2. Students must have a tutor, this is the prerequisite for the program. Tutor can be any professor of the Department, not only her/his seminar/practical instructor. The applicant should contact the chosen professor and request him/her to undertake the tutorship. Professors of the Department maintain the right to accept or refuse to be the tutor of the applicant.
3. Special Rule: the applicant has to organize the chosen project and register at the tutor (NOT via NEPTUN) until the end of second academic week. Applications after the second week are not accepted.
4. Preconditions for the program: mark three (3) or better in Physiology I, successful closing lab and permission of the Department (arranged by the tutor).
5. The maximum number of participants in the program cannot exceed 100 students. In case, the number of applicants is higher than 100, the seminar/practical instructor or the course coordinator can refuse applicants with mark three or better. The name of the students registered to the program is published on the website of Department of Physiology on the 3rd academic week.
6. Two students works in team on one project, and prepare one mutual report, thus they get the same score at the end of the program regardless their contribution. The Journal Club and Lab Visit programs are carried out individually.
7. Evaluation of the students is based on the written report or the oral presentation using five grade score system (1-5). Grades are final, no make-up is allowed.
8. The list of offered programs are available at the practical lab of the elearning.med.unideb.hu web site (Department of Physiology menu item).
9. The deadline for the program is the end of the 11th academic week. Reports should be submitted to the tutor. Missing the deadline automatically results grade 1 (fail).
10. Detailed information for the program can be accessed on the elearning.med.unideb.hu web site (Department of Physiology menu item).

Subject: THE REGULATORY ROLE OF THE CELL MEMBRANE IN PHYSIOLOGICAL AND PATHOLOGICAL CONDITIONS
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Lecture: 20

1st week:
Lecture: Introduction, a general characterisation of the cell membrane. The electrical and biochemical characteristics of the surface membrane.

2nd week:
Lecture: General description of cardiac ionic currents. The connection between excitatory processes and the regulation of [Ca2+]i
3rd week:
**Lecture:** [Ca$^{2+}$]$_i$ dependent excitatory processes in the surface membrane of cardiac cells.

4th week:
**Lecture:** The structure of the skeletal muscle. Ionic channels underlying the excitability of the skeletal muscle. Molecular structure of ionic channels.

5th week:
**Lecture:** Changes in surface membrane function in inherited skeletal muscle disorders: degenerative forms (muscle dystrophies). Changes in surface membrane function in inherited skeletal muscle disorders: alterations in the muscle tone (myotonies).

6th week:
**Lecture:** The role of the surface membrane in the regulation of calcium homeostasis in neurons. Pathological conditions arising from abnormal calcium handling in neurons.

7th week:
**Lecture:** Changes in the membrane properties of the neurons under pathological conditions. Pathological conditions arising from the hyperexcitability of neurons.

8th week:
**Lecture:** The role of TRP channels in the regulation of biological processes of human skin cells. TRP-pathies.

9th week:
**Lecture:** The role of the endocannabinoid system in the transmembrane signaling of skin-derived cells. Is the human skin always "high"?

**Requirements**

1. **Signature of the semester**
   Lecture attendance may be followed up by the Department. The lecture will not be delivered if 5 or fewer students show up. Nevertheless, the lecture material is going to be asked in the final assessment.
   For continuous updates on all education-related matters, please check the elearning.med.unideb.hu website (Department of Physiology menu item).

2. **Evaluation during the semester**
   None.

3. **Examination**
   At the end of the course a written final assessment will be organized in the form of multiple choice questions. The result of this assessment will determine the verification mark of the credit course using the following conversion table:
   - 0-39.9 % - Failed
   - 40-54.9 % - Pass
   - 55-69.9 % - Satisfactory
   - 70-84.9 % - Good
   - 85-100 % - Excellent
Division of Biomathematics

Subject: COMPUTER SCIENCE
Year, Semester: 1st year/1st semester
Number of teaching hours: Practical: 28

1st week: Practical: Exemption Tests.

2nd week: Practical: Word processor programs, MS Word I.

3rd week: Practical: Word processor programs, MS Word II.

4th week: Practical: Word processor programs, MS Word III.

5th week: Practical: Fundamentals and basic concepts informatics.

6th week: Practical: Logical and physical realization of networks.

7th week: Practical: Internet

8th week: Practical: Spreadsheets programs, MS Excel I.

9th week: Practical: Spreadsheets programs, MS Excel II.

10th week: Practical: Spreadsheets programs, MS Excel III.

11th week: Practical: Spreadsheets programs, MS Excel IV.

12th week: Practical: Computerised presentation, MS PowerPoint.

13th week: Practical: Summary.

14th week: Practical: Test.

Requirements

The acquisition of fundamental theoretical and practical knowledge from the function of the modern personal computers. Course description: PC architecture, operating systems, file management, network knowledge, internet and its opportunities of application, word processor, spreadsheet, the usage of presentational programs, the achievement of scientific databases and its use.

Without registration, there is no way to do the course! First year students who missed/skipped the exemption test, but signed up for the course in the Neptun must attend the course and do the final test at the end. For students attending the informatics course a maximum of 4 absences are allowed during the semester to receive a signature (we recommend to use as few as possible, in case an emergency comes up). This is taken very seriously! Missing more than 4 classes automatically means losing the chance to pass the course. There will be a final test at the end of the semester. Students are allowed to make up the missed practices with another group but only on the given week, if there are enough free seats in the room.

The course start with an exemption test. Only first year students are allowed to write the exemption test at the first week of the given semester with their group (appointment should be checked in the
given timetable). In any other cases (students older than first year/repeaters/students who are not exempted) students have a final test at week 14 of the given semester. There is no other self control test during the semester. At the end of the course students will write a final test. The exemption and the final tests covers topics and skills in connection with Microsoft office Word, Excel, and PowerPoint (versions:2016) programs, as written in the curriculum. Both of the tests (exemption and the final test) are written tests. The tests are practical tests, conducted in the computer room. Students passing the exemption test will automatically receive 5 (excellent) grade at the end of the semester. Final grades based on the final test score will be given according to the followings: 0-60% = garde 1 (fail); 61%-70% = grade 2 (pass); 71% - 80% = grade 3 (satisfactory); 81% - 90% = grade 4; (good) 91% = garde 5 (excellent). Students should download free Office guide books from the internet offered at the webpage of the course (Email registration is required for downloading files). Students who did not get exemption/did not show up at the exemption test/repeaters/students older than first year MUST ATTEND on the course. They should join to one of the groups mentioned in the timetable. The number of the seats is limited in the classroom. Students who has informatics course in the given appointment (according to the timetable) have priority to attend the lesson. Others are allowed to join to the given group if there are free seats. Older students have to do the whole course as well. Students passing the exemption test will automatically receive 5 (excellent) grade at the end of the semester. Students who failed the exemption test must attend the course and do the final test at the end. Students having ECDL (European Computer Driving Licence) or are not required to write the exemption test, they should show their ECDL certificate to the educational manager of the deparatment and they will be exempted automatically.

Division of Biophysics

Subject: MODERN BIOPHYSICAL METHODS IN BIOLOGY AND MEDICINE
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Lecture: 24

3rd week:
Lecture: Luminescence spectroscopy. Theoretical and technical background and principles of application of fluorescence spectroscopy. Fluorescence conjugation of biomolecules, techniques based on fluorescence resonance energy transfer.

4th week:
Lecture: Selected applications of Magnetic Reasonace Imaging: exploitation of molecular motions.

5th week:

6th week:
Lecture: Principles and applications of flow cytometry. Structure of a flow cytometer and its application fields: immunogenetics, receptor and antigen research and diagnostics, DNA and cell cycle analysis, measurement of membrane potential, membrane permeability and determination of cytosolic pH and ion concentrations, application of fluorescence resonance energy transfer to determine protein associations. (FCET).
7th week:

8th week:
Lecture: Modern electrophysiological techniques. Passive and active electrical properties of the cell membrane, structure and function of ion channels. Principles and application of the patch clamp technique: recording ionic currents and membrane potential.

9th week:

10th week:
Lecture: Closing test

Requirements

Aim of the course:
Based on the principles covered in biophysics and cell biology discussion of problems with special relevance to medical biology from a modern molecular biophysical and quantitative biological aspect.

Short description of the course topics:
1. Application of nuclear magnetic resonance spectroscopy (NMR) and imaging (MRI) in biology and medicine
2. Luminescence spectroscopy.
5. Advanced microscopy.
6. Modern electrophysiological techniques
7. Slide-based cytometry.

Compulsory literature: course material and lecture slides published on the website of the Department

Recommended reading: Medical biophysics (Damjanovich, Fidy, Szöllősi Eds.), Medicina, 2009;

Web address for the course material:
Type of examination: practical grade, 5 levels

Requirements:
Conditions for signing the lecture book: attending 5 lectures out of 7. Attention! Lecture books are handled exclusively by the study advisor during the dedicated office hours!

Type of examination: practical grade, 5 levels

Examination: Written test. The exam date is shown in the.

below 50%: fail
50%-59%: pass
60-69 %: satisfactory
70-79 %: good
Division of Operative Techniques and Surgical Research

Subject: BASIC KNOWLEDGE OF SURGICAL BIOMATERIALS FOR STUDENTS OF PHARMACY

Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 8
Seminar: 16
Practical: 8

1st week:
Lecture: General and surgical deontology. Surgical armamentarium
Seminar: Cutting, hemostatic, grasping-retracting, special and suturing instruments. Order of the instrumental trays and tables. Handling and sterilization of the instruments.

2nd week:
Lecture: Wound closure and the required surgical biomaterials.
Practical: Surgical needles, suture materials, knotting and suturing techniques.

3rd week:
Lecture: Operating room environment, order of the operating work. Scrubbing and the required materials. Preparations for the operation, isolation of the operative field.
Practical: Scrubbing. Wound closure with different suturing techniques on surgical training models.

4th week:
Seminar: Different types of infusion accessories. Demonstration of the infusion pump.
Practical: Ligation of vessels on gauze models. Vein preparation/cannulation, injection techniques (i.m., i.v.) and taking blood samples on phantom models. Preparing the infusion set and connecting it to the venous catheter. Different types and use of blood pressure manometers.

5th week:

6th week:

7th week:
Lecture: Ethical issues for animal research. Animal care, ethical problems, permissions. Keeping and treatment of experimental and
**REQUIRED ELECTIVE COURSES**

Laboratory small animals (mouse, rat).

**Seminar:** Requirements of ISO, GLP.
Preclinical experiments in pharmacology.

**8th week:**
**Lecture:** Narcosis and anesthesia of experimental animals. Intraoperative monitoring.

**Seminar:** Technique of dissection of isolated organs (heart, vessel, muscle, bowel preparates).
In vivo techniques and models. Extermination, autopsy and taking samples of experimental animals.

**Self Control Test**

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**Requirements**

**Prerequisite:** Pharmaceutical technology theory I, Human physiology II

**Aim of the subject:**
The main aim is to acquire up-to-date theoretical and practical knowledge that is appropriate to the modern age and the students can get acquainted with the basic methods, that can help the pharmacy students to be familiar with the basic surgical interventions and the required materials during their future work. The students have to learn the characteristics and the means of application of the biomaterials (suturing materials, bioplasts, tissue adhesives, catheters, drains, stoma bags, urine condoms, incontinence pads) that can be used during the surgical practice. They should have the knowledge of the manual interventions that they may need during pharmacological experimental work. A further aim is to improve manual skills. They have to possess the basic knowledge and skills for catastrophe, in order to be capable to help in manual (operative) - often life-saving - activity. They should have the basic knowledge to be able to inform patients, which is part of the work done by the dynamic team of a doctor and pharmacist.

**Requirements:**
If the student is absent from more than 20% of all teaching hours (6 out of 32) without any acceptable reason, the Department may refuse to sign the Lecture Book. Besides the suggested reading materials the hand-outs are also part of the curriculum. Performance is assessed on the five-grade scale (AW5) and it is based on the work through the semester and completion of the final written test at the end of the course.

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**Faculty of Pharmacy**

**Subject:** **INTRODUCTION TO SCIENTIFIC RESEARCH**

**Year, Semester:** 2nd year/1st semester

**Number of teaching hours:**
**Lecture:** **14**
CHAPTER 22

TITLES OF THERSES

Department of Anatomy, Histology and Embryology

1. Title: Possible applications of morphofunctional matrices for classification of neurons (computer modelling)
   Tutor: Ervin Wolf M.Sc., Ph.D.

2. Title: Correlation analysis of functional brain maps

3. Title: Investigation of contour integration processing in the primary visual cortex using voltage sensitive dye imaging

4. Title: Investigation of signalling mechanisms that regulate cartilage development and maturation
   Tutor: Róza Zákány M.D., Ph.D.

5. Title: Interrogation of spinal dorsal horn circuits with electrophysiological and optogenetic tools

6. Title: Light- and electron microscopy level analysis of the axons and axon collaterals of spinal lamina I projection neurons

7. Title: Local synaptic connections of projection neurons in spinal lamina I

8. Title: Morphometric analysis of excitatory and inhibitory interneurons in the spinal dorsal horn
   Tutor: Péter Szücs M.D., Ph.D.

9. Title: Extracellular matrix in the developing brainstem
   Tutor: Ildikó Wéber M.Sc., Ph.D.

10. Title: Matrix metalloproteases in vestibular lesion
    Tutor: Botond Gaál M.Sc., Ph.D.

11. Title: Investigation of neuronal network development in the spinal cord
    Tutor: Zoltán Mészár M.Sc., Ph.D.

12. Title: The role of the molecular clock in healthy and osteoarthritic chondrocytes
    Tutor: Csaba Matta M.Sc., Ph.D.

13. Title: Role of PACAP signalling in cartilage differentiation and regeneration
    Tutor: Tamás Juhász M.Sc., Ph.D.

14. Title: Distribution of the extracellular matrix in the red nucleus and pararubral area
    Tutor: Éva Rácz M.Sc., Ph.D.

15. Title: The endocannabinoid-mediated modulation of spinal nociception

16. Title: The role of astrocytes in spinal pain processing
    Tutor: Zoltán Hegyi M.Sc., Ph.D.

17. Title: Quantitative morphological studies of primary afferent-motoneuron connections in the frog's brainstem
    Tutor: András Birinyi M.Sc., Ph.D.

18. Title: Role of pro-inflammatory cytokines in neuron-glia interaction during inflammatory pain states
    Tutor: Krisztina Holló M.Sc., Ph.D.

19. Title: Mapping of synapses on dendrites of GABAergic neuron subtypes in the cerebral cortex
    Tutor: Petra Talapka Ph.D.

Department of Biochemistry and Molecular Biology

1. Title: Dissecting and aligning the regulatory and effector mechanisms shaping murine M2 macrophages

2. Title: Dissecting the transcriptional network allowing macrophages to control angiogenesis

3. Title: The role of the transcription factor BACH1 in macrophage function and tissue homeostasis
   Tutor: László Nagy M.D., Ph.D., M.H.A.Sc.

4. Title: The role of retroviral proteases in the retroviral life cycle.
   Tutor: József Tózsér M.Sc., Ph.D., D.Sc.
5. Title: The role of tissue transglutaminase in rolling and adhesion of neutrophil granulocytes
   Tutor: Zoltán Balajthy M.Sc., Ph.D.

6. Title: Saliva biomarkers of oral cancer.
   Tutor: Beáta Scholtz M.Sc., Ph.D.

7. Title: Production of dendritic cells and macrophages from embryonic stem cells.
8. Title: Transcriptional reprogramming of murine embryonic stem cell progenitors.
   Tutor: István Szatmári M.Sc., Ph.D.

9. Title: Studies in the regulation of tissue specific and cancer specific gene expression by using genomic and bioinformatic tools
   Tutor: László Bálint Bálint M.D., Ph.D.

10. Title: Effects of various coeliac autoantibodies on transglutaminase 2 activities and interactome.

11. Title: Modification of the enzymatic activity of transglutaminase 2 by site-directed mutagenesis. Therapeutic utilization of modified transglutaminase 2.

12. Title: Studying structure and function relationship of transglutaminases and its application in translational medicine
   Tutor: Róbert Király M.Sc., Ph.D.

13. Title: Quantitative proteomic analysis of the tear proteins of diabetic patients.
   Tutor: Éva Csősz M.Sc., Ph.D.

14. Title: Evaluation of the browning potential and inducibility from human fat tissue biopsies
   Tutor: Mária Szatmári-Tóth M.Sc., Ph.D.

15. Title: Identification of regulatory SNPs in promoter regions of different species by bioinformatic analyses.
   Tutor: Endre Barta M.Sc., Ph.D.

16. Title: Alterations in structural properties of the transcription machinery in relation to disease development

17. Title: Drug discovery for protein interactions

18. Title: Functional aggregation in innate immunity

19. Title: Molecular factors in cell differentiation

20. Title: New comparative methods of protein evolution and sequence analysis

21. Title: Regulation of protein half-life via protein interactions

22. Title: Studying the re-programming mechanisms of viral proteins.

23. Title: The role of signaling pathway perturbations in cancer development
   Tutor: Mónika Fuxreiter M.Sc., Ph.D., D.Sc.

24. Title: Characterization of adipocytes with thermogenic potential

25. Title: In vitro study about the effect of environmental conditions (e.g.: temperature, oxygen availability) on the differentiation potential and beigeing process of primary adipocytes

26. Title: Investigation of the beigeing plasticity of adipocytes, identification of key extrinsic and intrinsic factors
   Tutor: Beáta Bartáné Tóth M.Sc., Ph.D.

27. Title: Investigation of novel molecular elements of the browning machinery in different human adipose tissues

28. Title: Investigation of the biological significance of “batokine” secretion in human cell models
   Tutor: Endre Károly Kristóf M.D.

29. Title: Characterization of genetic risk factors of chronic pancreatitis
   Tutor: András Szabó M.Sc., Ph.D.

Department of Biophysics and Cell Biology

1. Title: Investigation of cell surface distribution of erbB-2 oncoprotein in breast tumor cell lines

2. Title: Role of tumor stem cells in trastuzumab resistant breast tumors
   Tutor: János Szöllősi M.Sc., Ph.D., D.Sc., M.H.A.Sc.

3. Title: Studying the inactivation of voltage gated potassium ion channels in heterologous expression systems
   Tutor: György Panyi M.D., Ph.D., D.Sc.
4. Title: Epigenetic regulation of nucleosome-DNA cohesion  
   Tutor: Gábor Szabó M.D., Ph.D., D.Sc.

5. Title: Mathematical analysis and computer modelling of the topology of cell surface proteins  
   6. Title: Role of MHC in the organization of cell surface proteins  
   Tutor: László Mátyus M.D., Ph.D., D.Sc.

7. Title: Cytometry of cytotoxic lymphocytes  
   8. Title: Physiological roles of the multidrug resistance transporter P-glycoprotein  
   Tutor: Zsolt Bacsó M.D., Ph.D.

9. Title: Elucidation of the catalytic mechanism of ABC transporters  
   Tutor: Katalin Goda M.Sc., Ph.D.

10. Title: Development of machine learning-based methods for identification of cellular components  
   11. Title: Effect of the lipid composition of the cell membrane on membrane protein clustering and on cell biological processes related to the cell membrane  
   12. Title: Role of changes in the dynamic properties of the cell membrane in the protective role of methane against hypoxia-reperfusion injury  
   Tutor: Péter Nagy M.D., Ph.D., D.Sc.

13. Title: Membrane biophysical and cell biological effects of cyclodextrins  
   14. Title: The role of the Hv1 proton channel in vascular smooth muscle cells  

15. Title: Biophysical analysis and functional significance of cell surface protein patterns in T cell-mediated immune responses  
   Tutor: Andrea Dóczy-Bodnár M.Sc., Ph.D.

16. Title: Ligand dependence of nuclear receptor function studied by single molecule microscopy  
   17. Title: Studying the function and interactions of interleukin-2 and -15 receptors by advanced microscopy  
   Tutor: György Vámosi M.Sc., Ph.D.

18. Title: Generating and characterizing multicomponent primary human cell cultures for transplantation therapy of stem cell deficient corneas  

19. Title: Molecular interactions in histopathological diagnosis: applying FRET in a confocal fluorescence digital pathology slide scanner  

20. Title: Optimizing reprogrammed, chimeric antigen receptor (CAR) -transduced human T cells for tumor therapy  

21. Title: Role of receptor tyrosine kinases and integrins in the therapy resistance of tumors  
   Tutor: György Vereb M.D., Ph.D., D.Sc.

22. Title: Ion channel expression of engineered T cells used in cancer immunotherapy  

23. Title: Ion channel expression of tumor infiltrating T cell populations  
   Tutor: Péter Hajdu M.Sc., Ph.D.

**Department of Anesthesiology and Intensive Care**

1. Title: Experimental testing of the neuromuscular junction  
   Tutor: Ákos Fábián M.D., Ph.D.

2. Title: Preemptive and preventive analgesia  
   Tutor: Béla Fülesdi M.D., Ph.D., D.Sc.

3. Title: The role of hypotermia in neuroprotection  
   Tutor: Csilla Molnár M.D., Ph.D.

4. Title: Clinical studies in the field of neuromuscular block and its reversal  
   Tutor: Adrienn Pongrácz M.D., Ph.D.

**Institute of Behavioural Sciences, Faculty of Public Health**

1. Title: Basic issues of psy-complex (psychology, psychotherapy, psychiatry)  

2. Title: Changing attitudes towards human phenomena in Western medicine  

3. Title: Changing attitudes towards human phenomena in Western medicine  

4. Title: Contemporary problems of Psy-complex  

5. Title: Contemporary problems of Psy-complex  

6. Title: Health and disease in cultural context
7. Title: Health and disease in cultural context
8. Title: Medicalization and its social context
9. Title: Medicalization and its social-cultural context
10. Title: Prolongation of life as a modern Western project
11. Title: Prolongation of life as a modern Western project
12. Title: The importance of the point of view of psychoanalysis for a humanistic medicine.
   Tutor: Attila Bánfalvi M.A., Ph.D., C.Sc.

13. Title: End of life decisions
    Tutor: Sándor Kőműves M.A., Ph.D.

14. Title: Evolutionary Psychopathology
15. Title: Humor and Mental Health
16. Title: Life History Strategy elements in mate choice, attachment, and mental health
    Tutor: Roland Tisljár M.A., Ph.D.

Department of Inorganic and Analytical Chemistry
1. Title: Application of citrate buffers in clinical analysis and diagnosis. (A literature survey)
   Tutor: Imre Tóth D.Sc.

2. Title: Experimental methods for the study of redox properties of copper(II) complexes (A literature survey)
   Tutor: Katalin Várnyagi M.Sc., Ph.D., D.Sc.

3. Title: The role of oxidation of biomolecules by catalysation of metal ions in the development and onset of neurodegenerative disorders. (A literature survey)
   Tutor: Csilla Kállay M.Sc., Ph.D.

Division of Cardiac Surgery
1. Title: The effect of carbon dioxide deairing during valve surgery - review of the literature
   Tutor: Tamás Szerafin M.D., Ph.D.

2. Title: Short-term results of operations accomplished in A-type aortic dissections
   Tutor: Tamás Maros M.D.

3. Title: Tricuspid valve surgery review of the literature
   Tutor: István Szentkirályi M.D.

4. Title: Sutureless aortic valve implantation review of the literature
   Tutor: Lehel Palotás M.D.

5. Title: Non-occlusive mesenteric ischaemia after cardiac surgery-review of the literature
   Tutor: Tamás Debreceni M.D.

Department of Preventive Medicine, Faculty of Public Health
1. Title: Health-related behaviours among adolescents
2. Title: Mental health of health care workers
3. Title: Mental health of youth
4. Title: Relationship between health literacy and health status
   Tutor: Éva Bíró M.D., Ph.D.

5. Title: The use of Molecular genetic techniques for the detection of genome alterations in malignant diseases (review the literature)

6. Title: Gene-environment interactions and obesity (systematic review)
7. Title: Prevalence of obesity (trend analysis)
8. Title: The effect of neighborhood environment on physical activity and diet (systematic review)
9. Title: The effect of school based health promotion programs on nutrition (systematic review)
   Tutor: Helga Bárdos M.D., M.Sc., Ph.D.

10. Title: Burden of diseases attributed to environmental risk factors in European countries
11. Title: Mortality due to environmental risk factors in European countries
    Tutor: Sándor Szűcs M.Sc., Ph.D.

12. Title: Genomic and environmental determinants of cardiovascular diseases (genetic epidemiology analyses)
13. Title: Genomic determinants of cardiovascular diseases
    Tutor: Szilvia Fiatal M.D., Ph.D.
14. Title: Monitoring type 2 diabetes design strategies
15. Title: Prevalence of type 2 diabetes (specific region)
Tutor: Attila Csaba Nagy M.D., Ph.D.

16. Title: Evaluation of chronic care for adult overweighted in general medical practice
17. Title: Evaluation of chronic care for adult smokers in general medical practice
19. Title: Evaluation of chronic care for adult smokers in general medical practice
20. Title: Evaluation of chronic care for diabetes mellitus in general medical practice
21. Title: Evaluation of chronic care for diabetes mellitus in general medical practice
22. Title: Evaluation of chronic care for hypertension in general medical practice
23. Title: Evaluation of chronic care for hypertension in general medical practice
24. Title: Evaluation of foreign aid for the health sector in medium and low income countries
Tutor: János Sándor M.D., Ph.D.

25. Title: Genetic epidemiology of obesity (literature review)
26. Title: Genotoxicity evaluation of environmental and occupational chemical exposures
27. Title: The role of the FTO gene in the development of metabolic syndrome
Tutor: Károly Nagy Ph.D.

28. Title: Pesticide use in developed and developing countries
29. Title: Pesticide use in developed and developing countries
Tutor: László Pál Ph.D.

30. Title: Genotoxic exposures in the work- and ambient environment
31. Title: Genotoxic exposures in the work- and ambient environment
32. Title: Health impact assessment of policies, programmes and projects
33. Title: Health impact assessment of policies, programmes and projects

34. Title: Investigation of workplace hazards
35. Title: Investigation of workplace hazards
36. Title: Occupational diseases
37. Title: Occupational diseases
Tutor: Ádám Balázs M.D., M.Sc., Ph.D.

**Division of Cardiology**
1. Title: Ablation in atrial fibrillation
2. Title: Novel treatment modalities in atrial fibrillation (catheter ablation, surgery and pacemakers)
Tutor: Zoltán Csanádi M.D., Ph.D., D.Sc.

3. Title: Flow calculation in 3D reconstructed coronary arteries
Tutor: Zsolt Kőszegi M.D., Ph.D.

4. Title: Cardiovascular aspects of diabetes mellitus
5. Title: Left ventricular function of obese patients.
Tutor: Tibor Fülöp M.D., Ph.D.

6. Title: Interventional treatment of chronic total coronary occlusions
Tutor: Tibor Szűk M.D., Ph.D.

7. Title: Supraventricular arrhythmias.
Tutor: Csaba Kun M.D.

8. Title: Stem cell therapy after myocardial infarction
Tutor: László Balogh M.D.

9. Title: Cardiac rehabilitation in coronary disease
10. Title: Modern antithrombotic therapy
Tutor: Nóra Homoródi M.D.

11. Title: Cardiovascular complications of dermatomyositis.
Tutor: Andrea Péter M.D.

12. Title: Targeted temperature management after cardiac arrest: outcome
Tutor: Szabolcs Gergely M.D., Ph.D.

13. Title: Inotropes and inodilators in advanced heart failure: clinical implications
14. Title: Novel pharmacological therapies in heart failure  
   Tutor: Attila Borbély M.D., Ph.D.

15. Title: Assessment of right ventricle function with 3D echocardiography  
   Tutor: Csaba Jenei M.D.

16. Title: Examining ischaemic and arrhythmogenic side effects of 5-fluorouracil chemotherapy in oncology patients  
   Tutor: Dániel Czuriga M.D., Ph.D.

17. Title: Translational research in a cardio-oncological small animal model  
   Tutor: László Fülöp M.D., Ph.D.

18. Title: Invasive hemodynamic measurements in heart failure patients  
   Tutor: Ildikó Rácz M.D., Ph.D.

19. Title: The role and location of the transtelephonic ECG system in emergency patient care.  
   Tutor: Ildikó Rácz M.D., Ph.D.

**Department of Botany**

1. Title: Stress tolerance and resistance mechanisms of higher plants  

2. Title: The study of chromatin and microtubule organization in cells of higher plants  
   Tutor: Csaba Máthé M.Sc., Ph.D.

3. Title: Plant bioactive compounds  
   Tutor: Gábor Vasas M.Sc., Ph.D., D.Sc.

4. Title: Role of glycoproteins in infection and immunology (bibliographic)  
   Tutor: János Kerékgyártó M.Sc., Ph.D., C.Sc.

**Division of Clinical Physiology**

1. Title: Improvement of myocardial inotropy under physiological and pathological conditions  
   Tutor: Zoltán Papp M.D., Ph.D., D.Sc.

2. Title: The role of angiotensin II in cardiovascular diseases  

3. Title: Vascular alterations leading to hypertension.  

4. Title: Endogenous regulation of the renin-angiotensin-aldosterone system and its clinical significance  
   Tutor: Miklós Fagyas M.D., Ph.D.

5. Title: Investigating mechanisms contributing to the myogenic tone of the coronary arteries  
   Tutor: Viktória Csató M.Sc., Ph.D.

**Division of Nuclear Medicine and Translational Imaging**

1. Title: Development of interactive E-learning material for nuclear medicine  
   Tutor: József Varga M.Sc., Ph.D.

2. Title: Assessment of Diabetic Foot with Different Nuclear Medicine procedures  
   Tutor: Ildikó Garai M.D., Ph.D.

**Division of Radiology and Imaging Science**

1. Title: Analysis of Pediatric Radiology Examinations  
   Tutor: Nóra Vrancsik M.D.

2. Title: Posttherapeutic I-131 whole body SPECT/CT in patients with thyroid cancer  
   Tutor: Ildikó Garai M.D., Ph.D.

3. Title: The role of Tc99m-Tektrotyd SPECT/CT to evaluate metastatic neuroendocrine tumors  
   Tutor: Ildikó Garai M.D., Ph.D.

3. Title: Localisation of anatomical regions of CT scans with machine learning methods  
   Tutor: Zoltán Barta M.D.

**Department of Human Genetics**

1. Title: Characterization of factor-C protein family using sequence databases.  

2. Title: Study of a gene regulating differentiation in bacteria.  
3. Title: Analysis of mono-ADP-ribosylated proteins from pro- and eukaryotic cells. Tutor: András Penyige M.Sc., Ph.D.

4. Title: Analysis of an A factor non-producer bald mutant Streptomyces griseus strain with respect of antibiotic production and cell differentiation. Tutor: Zsuzsanna Birkó M.Sc., Ph.D.

5. Title: Study of mitochondrial copy number changes in glioblastoma. Tutor: Judit Keserű M.Sc., Ph.D.

6. Title: miRNA-profiling of regressive Wilms' tumors. Tutor: Gergely Buglyó M.D., Ph.D.

7. Title: Global analysis of the human blood plasma epitome and interactome in health and disease. Tutor: Kitti Pázmándi M.Sc., Ph.D.

8. Title: The role of the HOFI/SH3PXD2B adaptor protein in the regulation of the tumor microenvironment. Tutor: Árpád Lányi M.Sc., Ph.D.

9. Title: The role of innate immune cells in the development of allergic responses. Tutor: Péter Gogolák M.Sc., Ph.D.

10. Title: The role of innate lympoid cells (ILC) in human diseases. Tutor: Attila Bács M.Sc., Ph.D.


12. Title: Investigation of phytocannabinoid effects on human monocyte-derived dendritic cells. Tutor: Attila Szöllösi M.D., Ph.D.


14. Title: Study of non-apoptotic cytotoxic processes during immune response, new way of killing apoptosis resistant tumor cells. Tutor: Gábor Koncz M.Sc., Ph.D.

Department of Immunology

1. Title: The role of innate immune cells in the development of allergic responses. Tutor: Péter Gogolák M.Sc., Ph.D.

2. Title: The role of innate lympoid cells (ILC) in human diseases. Tutor: Attila Bács M.Sc., Ph.D.

3. Title: Altered differentiation of monocyte derived dendritic cells and their functional differences. Tutor: Péter Gogolák M.Sc., Ph.D.

4. Title: Investigation of phytocannabinoid effects on human monocyte-derived dendritic cells. Tutor: Attila Szöllösi M.D., Ph.D.

5. Title: Identification of new viral sensors and new regulatory mechanisms in the antiviral responses of human dendritic cells. Tutor: Kitti Pázmándi M.Sc., Ph.D.

6. Title: Study of non-apoptotic cytotoxic processes during immune response, new way of killing apoptosis resistant tumor cells. Tutor: Gábor Koncz M.Sc., Ph.D.

Department of Clinical Oncology

1. Title: Prognostic factors in colorectal cancer. Tutor: Csilla András M.D., Ph.D.

2. Title: Treatment modalities in pancreas cancer. Tutor: Péter Arkosy M.D., Ph.D.

3. Title: Current treatment of metastatic bladder cancer. Tutor: Balázs Juhász M.D.
5. Title: Cardiological side effects of fluorouracyl in oncological patients
   Tutor: Anita Árokszállási M.D.

6. Title: Palliation in oncology
   Tutor: Éva Szekanecz M.D., Ph.D.

7. Title: Prognostic factors in low grade and high grade gliomas
8. Title: Treatment options in advanced and metastatic breast cancer
   Tutor: József Virga M.D.

**Department of Laboratory Medicine**

1. Title: Evaluation of known and novel autoantibodies in the diagnostics of autoimmune and immune-mediated disorders
   Tutor: Péter Antal-Szalmás M.D., Ph.D.

2. Title: Identification of novel biomarkers for the detection and prediction of cirrhosis associated infections
   Tutor: Harjit Pal Bhattoa M.D., Ph.D.

3. Title: Vitamin D status in colorectal carcinoma
   Tutor: Harjit Pal Bhattoa M.D., Ph.D.

4. Title: Cytogenetic aberrations in infertility
5. Title: Genetic examinations in t(12;21) positive childhood acute lymphoblastic leukemia
   Tutor: Anikó Ujfalusi M.D., Ph.D.

6. Title: Analysis of serum human epididymis protein 4 (HE4) in the follow-up of cystic fibrosis patients
7. Title: Investigation of platelet microRNA expressions in septic conditions
   Tutor: Béla Nagy Jr. M.D., Ph.D.

8. Title: Genetic predisposition in autoimmune diseases
9. Title: Investigations of miRNAs in autoimmune diseases
   Tutor: Erika Zilahi M.Sc., Ph.D.

**Division of Clinical Laboratory Science**

1. Title: Effect of alfa2-plasmin inhibitor heterogeneity on the risk of thrombosis
2. Title: Investigation of alfa2-plasmin inhibitor and fibrinogen interaction
6. Title: Dosimetric aspects of extracranial stereotactic radiotherapy in non-small cell lung cancer patients
Tutor: Mihály Simon

7. Title: Dealing with irradiation induced side effects
8. Title: Neoadjuvant radio-chemotherapy of rectal cancer
9. Title: Palliative and supportive care in radiooncology
10. Title: Radiotherapy of breast cancer
Tutor: Andrea Furka M.D., Ph.D.

11. Title: Determining acute and chronic side effects after extracranial stereotactic radiotherapy in non-small cell lung cancer patients
Tutor: Emese Csiki M.D.

12. Title: Determining therapeutic response, survival, prognostic factors after extracranial stereotactic radiotherapy in non-small cell lung cancer patients
Tutor: Árpád Kovács M.D., Ph.D. habil.

13. Title: The role of radiotherapy in patients with benign diseases
Tutor: Erika Szántó M.D.

Department of Dermatology
1. Title: Ablative laser treatment in Hailey-Hailey disease
2. Title: DNA repair mechanisms
3. Title: Genetic susceptibility in psoriasis
4. Title: Indications in ablative Er:YAG laser
5. Title: Methods of sunprotection
Tutor: Éva Remenyik M.D., Ph.D., D.Sc.

6. Title: Chemical burns - special features and treatment options
7. Title: Dermatofibrosarcoma protuberans - therapeutic possibilities
8. Title: Possibilities of skin grafting in the reconstruction of defects after removal of skin tumors
9. Title: Role of NPWT (Negative Pressure Wound Therapy) in the treatment of burns

10. Title: Role of subcutaneous island pedicle flap in the reconstruction of defects after removal of skin tumors
Tutor: István Juhász M.D., Ph.D., C.Sc.

11. Title: Deformities and disolorations of the nails: relation to other medical conditions.
Overview of the literature and case reports.
Tutor: Éva Szabó M.D., Ph.D.

12. Title: Different applications of the latissimus dorsi musculocutaneous flap
Tutor: Zoltán Péter M.D.

13. Title: New approaches in the classification and therapy of chronic urticaria
14. Title: Possibility of allergen specific immunotherapy in the treatment of atopic dermatitis
Tutor: Krisztiján Gáspár M.D., Ph.D.

15. Title: Melanoma diagnostics, risk factors
Tutor: Borbála Kiss M.D., Ph.D.

16. Title: Lipid disorder associated dermatological symptoms
17. Title: Pathogenesis and therapy of acne
18. Title: Role of lipid environment in the activation of dermal macrophages
Tutor: Dániel Töröcsik M.D., Ph.D.

19. Title: New therapies in severe psoriasis vulgaris
20. Title: Opalizumab therapy in chronic urticaria
Tutor: Andrea Szegedi M.D., Ph.D., D.Sc.

Department of Medical Chemistry
1. Title: Investigation of Ser/Thr protein phosphatase in pathogenic fungi

2. Title: Interaction of protein phosphatase 1 catalytic subunit with regulatory proteins

3. Title: Regulation of macrophage activation
Tutor: László Virág M.D., Ph.D., D.Sc.
4. Title: Signal transduction pathways in pulmonary endothelial cells
   Tutor: Csilla Csoros M.Sc., Ph.D., D.Sc.

5. Title: Structural and functional investigation of a fungus specific protein phosphatase
   Tutor: Ilona Farkas M.Sc., Ph.D.

6. Title: Study of metabolic processes with special regard to the involvement of mitochondrial activity.

7. Title: Application of High-Content Screening in Life Sciences
   Tutor: Endre Kökai M.Sc., Ph.D.

8. Title: Signalling pathways in endome
9. Title: Study of the role of protein phosphatase in wound healing
   Tutor: Beáta Lontay M.Sc., Ph.D.

10. Title: Inhibition of sodium-glucose cotransporter of kidney by glucose-based compounds also interfering with glycogenolysis
    Tutor: Tibor Docsya M.Sc., Ph.D.

11. Title: Regulation of protein phosphatase-1 by inhibitory proteins and the translocation of the targeting subunit
    Tutor: Andrea Kiss M.Sc., Ph.D.

12. Title: High-Throughput Screening
    Tutor: Csaba Hegedűs M.D., L.D.S., M.Sc., Ph.D.

13. Title: Autophagy in physiological and pathological processes
    Tutor: Katalin Kovács M.Sc., Ph.D.

    Tutor: Krisztina Tar M.Sc., Ph.D.

Department of Medical Microbiology
1. Title: Antimicrobial cell-mediated immunity measured by mRNA tests
   Tutor: József Kónya Ph.D., D.Sc.

2. Title: Evaluation of in vitro efficacy of different new antibiotics against multiresistant bacteria
   Tutor: Judit Szabó M.D., Ph.D.

3. Title: Role of HPV in head and neck cancers
   Tutor: Krisztina Szarka M.Sc., Ph.D.

4. Title: Evaluation of fungicidal effect of antifungal agents using time-kill curves
5. Title: New and older agents in antifungal chemotherapy
   Tutor: László Majoros M.D., Ph.D.

6. Title: Prevalence of human polyomaviruses
    Tutor: Eszter Csoma M.Sc., Ph.D.

7. Title: Effects of human papillomavirus oncoproteins on cellular signaling pathways in keratinocytes
    Tutor: Anita Szalmás M.Sc., Ph.D.

8. Title: Molecular epidemiology of aminoglycoside resistance in nosocomial Gram negative bacteria
    Tutor: Gábor Kardos M.D., Ph.D.

9. Title: Intratypical variation of human papillomaviruses
    Tutor: György Veress M.Sc., Ph.D.

10. Title: The importance of fungal quorum-sensing in antifungal therapy against Candida biofilms.
    Tutor: Renátó Kovács M.Sc., Ph.D.

Department of Internal Medicine
1. Title: Immunotherapy of B cell lymphomas.
2. Title: Safety profile of prolonged rituximab therapy in lymphomas.
3. Title: Targeted therapy in non-Hodgkin's lymphomas
   Tutor: Lajos Gergely M.D., Ph.D. habil.

4. Title: Lipid abnormalities in hypothyreoidism.
5. Title: The function of LDL in lipid metabolism
   Tutor: György Paragh M.D., Ph.D., D.Sc.
6. Title: Diagnostic tests and imaging techniques in endocrinology.
Tutor: Endre Nagy M.D., Ph.D., D.Sc.

7. Title: Adipokines and Insulin Resistance
8. Title: Insulin resistance and non-alcoholic fatty liver disease
9. Title: Obesity: Diagnosis and Treatment
10. Title: Obesity: Etiology and Co-morbidities
Tutor: Péter Fülöp M.D., Ph.D. habil.

11. Title: Diabetic neuropathy and oxidative stress
Tutor: Ferenc Sztanek M.D., Ph.D.

12. Title: Autoimmune disorders and GI tract
Tutor: Zsolt Barta M.D., Ph.D.

13. Title: The disease course after stent implantation in peripheral arterial disease
Tutor: György Kerekes M.D., Ph.D.

14. Title: Novel therapeutical approaches in multiple myeloma
15. Title: The impact of multi-drug resistance genes in the prognosis of lymphoproliferative disorders
Tutor: László Váróczy M.D., Ph.D. habil.

16. Title: Inherited and acquired thrombophilia
17. Title: New direct oral anticoagulants
18. Title: Stem cell therapy in peripheral arterial disorders
Tutor: Zoltán Boda M.D., Ph.D., D.Sc.

19. Title: Gastric cancer: clinics and treatment
20. Title: Gastrointestinal bleeding
21. Title: Gluten sensitive enteropathy
22. Title: Inflammatory bowel diseases.
23. Title: Lymphomas in the gastrointestinal tract.
Tutor: István Altorjay M.D., Ph.D., D.Sc.

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30. Title: Therapeutic options in primary sclerotizing cholangitis
31. Title: Treatment of autoimmune hepatitis
Tutor: István Tornai M.D., Ph.D. habil.

32. Title: A case history of an interesting acute myeloid leukaemia patient in the 2nd Department of Medicine (connection with the literature data)
Tutor: Attila Kiss M.Sc., Ph.D. habil.

33. Title: Chronic neutrophilic leukaemia
Tutor: Béla Telek M.D., Ph.D.

34. Title: Biological treatment of ulcerative colitis
35. Title: Extraintestinal association in IBD
Tutor: Károly Palatka M.D., Ph.D. habil.

36. Title: The role of Willebrand factor in various internal diseases.
Tutor: Ágota Schlammadinger M.D., Ph.D.

37. Title: Bacterial infection in liver cirrhosis
38. Title: Clinical significance of chronic pancreatitis
39. Title: Current therapeutic options of acute pancreatitis
Tutor: Zsuzsa Vitális M.D., Ph.D.

40. Title: Diagnosis and treatment of chronic lymphocytic leukemia
41. Title: Novel therapeutic approches in the treatment of multiple myeloma
42. Title: Philadelphia negative chronic myeloproliferative neoplasms - novel genetic and therapeutic improvements
43. Title: Recent advances in the management of chronic ITP
Tutor: Péter Batár M.D., Ph.D.

44. Title: Are the bacterial infections predictable in liver cirrhosis?
45. Title: Role of serological markers in prediction of disease course and response to therapy in inflammatory bowel diseases. Tutor: Mária Papp M.D., Ph.D. habil.

46. Title: Gastroesophageal reflux disease Tutor: László Dávida M.D.

Department of Pathology
1. Title: Molecular classification of glial neoplasms
2. Title: Overview of non-adenohypophysaer neoplastic lesion within and around the sella
3. Title: Use of IDH-1 immunohistochemistry in surgical neuropathology Tutor: Péter Molnár M.D., D.Sc.

4. Title: Functional analysis of malignant lymphomas using image analysis
5. Title: Mitotic failures and cancer progression
6. Title: Molecular diagnostics of solid tumors Tutor: Gábor Méhes M.D., D.Sc.

Division of Angiology
1. Title: Familial antiphospholipid syndrome Tutor: Pál Soltész M.D., Ph.D., D.Sc.

Department of Pharmacology and Pharmacotherapy
1. Title: Cardiovascular risk factors
2. Title: Metabolic link between obesity and insulin resistance Tutor: Zoltán Szilvássy M.D., Ph.D., D.Sc.

3. Title: Anxiety in the dental chair: pharmacological treatment
4. Title: Arrhythmic patient in dentistry
5. Title: Optional title in pharmacology
6. Title: Parkinson patient in the dental chair
7. Title: Pharmacological and clinical significance of adenosine receptor antagonists
8. Title: Pharmacological and non-pharmacological treatment of endothelial dysfunction
9. Title: Pharmacology of antidepressive drugs: dental implications
10. Title: Pharmacotherapy of trigeminal neuralgia Tutor: József Szentmiklósi M.D., Ph.D.

11. Title: Emerging roles of prostaglandin DP1 and DP2 receptors in acute and chronic aspects of allergic diseases
12. Title: Optional title in pharmacology
13. Title: Pharmacological treatment of acute decompensated heart failure (ADHF)
14. Title: Pharmacology of herbal remedies
15. Title: Pharmacology of neurogenic inflammation
16. Title: Pharmacotherapy of Amyotrophic Lateral Sclerosis (ALS)
17. Title: Pharmacotherapy of Duchenne Muscular Dystrophy (DMD)
18. Title: Possible pharmacological exploitations of TRPV1 receptors
19. Title: Use of Histone deacetylase inhibitors (HD1): Novel advances in cancer treatment Tutor: Róbert Pórszász M.D., Dr. habil., MBA, Ph.D.

20. Title: Effect of colony stimulating factors or other drugs on bone marrow-derived cell lines
21. Title: How insulin resistance influences drug effects
22. Title: Selected topic in field experimental hemato-oncology Tutor: Ilona Benkő M.D., Ph.D.

23. Title: Connections between rheumatoid arthritis and periodontal disease with a focus on pharmacotherapy
24. Title: Immune checkpoint inhibitors in advanced oral cancer
25. Title: Optional title on cancer chemotherapy Tutor: Attila Megyeri M.D., Ph.D.

26. Title: Class I antiarrhythmic agents: dental implications
27. Title: COX-3 inhibitors in the dental practice
28. Title: Optional title in pharmacology
29. Title: Pharmacotherapy of bronchial asthma: dental implications
30. Title: Reflux disease and the dental patient Tutor: Ágnes Cseppentő M.D.

31. Title: Optional title on antibacterial chemotherapy Tutor: Zsuzsanna Gál M.Sc., Ph.D.
32. Title: Optional title in pharmacology
Tutor: Béla Juhász D.Pharm., Dr. habil., Ph.D.

33. Title: Optional title in pharmacology
Tutor: Balázs Varga D.Pharm., Ph.D.

34. Title: Optional title in pharmacology
Tutor: Mariann Bombicz D.Pharm.

35. Title: Optional title in pharmacology
Tutor: Dániel Priksz D.Pharm.

Division of Clinical Immunology
1. Title: Immunoregulatory abnormality in undifferentiated connective tissue disease
2. Title: Interstitial lung diseases in MCTD.
3. Title: The presence of antiphospholipide antibodies in the disease course of the MCTD
4. Title: Vascular involvement in mixed connective tissue disease.
5. Title: Vascular risk factors in undifferentiated connective tissue disease
Tutor: Edit Bodolay M.D., Ph.D., D.Sc.

6. Title: Dermato/polymyositis overlap with antiphospholipide syndrome.
7. Title: Genetical study in myositis
8. Title: Improvement of quality of life in polymyositis and dermatomyositis patients by physiotherapy
Tutor: Katalin Dankó M.D.,Ph.D.,D.Sc.

Department of Physiology
1. Title: Expression and significance of the TASK channels in physiological and pathological conditions
Tutor: Péter Szűcs M.D., Ph.D.

2. Title: Alterations of intracellular calcium concentration in pathological conditions
Tutor: László Csernoch M.Sc., Ph.D., D.Sc.

3. Title: Regional differences in the electrophysiological properties of cardiomyocytes
Tutor: Péter Nánási M.D., Ph.D., D.Sc.

4. Title: Role of afterdepolarization mechanisms in the arrhythmogenesis
Tutor: Tamás Bányász M.D., Ph.D.

5. Title: Electrophysiological properties of mammalian cardiac tissues
Tutor: János Magyar M.D.,Ph.D.,D.Sc.

6. Title: Beat-to beat variability of cardiac repolarization
Tutor: Norbert Szentandrássy M.D., Ph.D.

7. Title: Studies on ion channels incorporated into artificial membranes

8. Title: Role of late sodium current in the arrhythmogenesis
Tutor: Balázs Horváth M.D.,Ph.D.

9. Title: Role of potassium channels in neuron function
Tutor: Balázs Pál M.D.,Ph.D.

10. Title: Properties of vanillloid receptors
Tutor: István Balázs Tóth M.Sc., Ph.D.

11. Title: Role of Protein Kinase C isoforms in cell function.
Tutor: Gabriella Czifra M.Sc., Ph.D.

Department of Emergency Medicine
1. Title: Cardiac rhythm disturbances.
Hypertensive emergencies.
Tutor: Zoltán Szabó M.D., Ph.D.

Division of Gastroenterology
1. Title: Gastric cancer: clinics and treatment
2. Title: Gastrointestinal bleeding
3. Title: Gluten sensitive enteropathy
4. Title: Inflammatory bowel diseases
5. Title: Lymphomas in the gastrointestinal tract
Tutor: István Altorjay M.D., Ph.D., D.Sc.

6. Title: Epidemiology, diagnostics and therapy of chronic hepatitis C
7. Title: Pathomechanism of alcoholic hepatitis
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<td>1. Title: Cardiopulmonary manifestation in systemic sclerosis</td>
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<td>Tutor: Gabriella Szűcs M.D., Ph.D.</td>
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<td>3. Title: Rheumatology 2017 - modern diagnostics and therapy.</td>
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<tr>
<td>Tutor: Zoltán Szekanecz M.D., Ph.D., D.Sc.</td>
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<td>4. Title: Osteoporosis in systemic sclerosis</td>
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<td>5. Title: Quality of life in systemic sclerosis</td>
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<td>Tutor: Szilvia Szamosi M.D., Ph.D.</td>
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<td>Tutor: Sándor Szántó M.D., Ph.D., D.Sc.</td>
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<td>Tutor: Zoltán Csiki M.D., Ph.D.</td>
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<td>1. Title: Basics of pharmacotherapy in the elderly</td>
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<td>Tutor: Gyula Bakó M.D., Ph.D., D.Sc.</td>
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<td>2. Title: Immunotherapy of B-cell lymphomas</td>
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<td>3. Title: The role of PET/CT imaging in lymphomas</td>
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and chronic stroke patients
3. Title: Non-invasive investigation of endothelial dysfunction.
   Tutor: László Csiba M.D., Ph.D., D.Sc., M.H.A.Sc.

4. Title: Comorbidity in Multiple sclerosis
   Tutor: Tünde Csépány M.D., Ph.D.

5. Title: Cerebral vasoreactivity after epileptic seizure
6. Title: Cerebral vasoreactivity after sleep deprivation
7. Title: Clinical outcome of intravenous thrombolysis in acute stroke patients with alcohol intoxication
8. Title: Short-term changes in cerebral vasoreactivity after decrease of elevated blood pressure
9. Title: Stroke mimics and intravenous thrombolysis: clinical outcome
   Tutor: László Oláh M.D., Ph.D., D.Sc.

10. Title: Immunological relations of narcolepsy
11. Title: Obstructive sleep apnea and cardiovascular risk
    Tutor: Norbert Kozák M.D., Ph.D.

Department of Neurosurgery
1. Title: Do middle cerebral artery aneurysms exhibit right sided dominance?
2. Title: Treatment of multiple cerebral metastases: clinical results
   Tutor: Sándor Szabó M.D., Ph.D.

3. Title: Current treatment of intraventricular hemorrhage
   Tutor: László Novák M.D., Ph.D. habil.

4. Title: Connection of proteoglycans and cell membrane receptors in the peritumoral extracellular matrix
   Tutor: Álmos Klekner M.D., Ph.D. habil.

5. Title: History of neurosurgical radiosurgery.
   Tutor: József Dobai M.D.

6. Title: Vertebroplasty.
   Tutor: Péter Ruszthi M.D.

Department of Obstetrics and Gynecology
1. Title: Clinical trials of new drugs for the treatment of osteoporosis
   Tutor: Ádám Balogh M.D., Ph.D., D.Sc.

2. Title: Diagnosis and Treatment of Endometrial Cancer
3. Title: Diagnosis and Treatment of Ovarian Cancer
4. Title: Diagnosis and Treatment of Vulvar Cancer
5. Title: Screening /Diagnosis and Treatment of Cervical Cancer
   Tutor: Zoltán Hernádi M.D., Ph.D., D.Sc.

6. Title: Non-invasive prenatal testing for chromosomal aneuploidies
   Tutor: Olga Török M.D., Ph.D. habil.

7. Title: Efficiency and safety of first line chemotherapy in ovarian cancer
8. Title: Efficiency and safety of second and subsequent line chemotherapy in ovarian cancer
9. Title: Efficiency of HPV vaccination
10. Title: Fetal assessment by biophysical profile
11. Title: Marker studies in ovarian cancer
12. Title: Molecular medicine and ovarian cancer
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14. Title: Neoadjuvant chemotherapy of cervical cancer
15. Title: Placental atherogenesis
16. Title: Surgical treatment of recurrent ovarian cancer
17. Title: Surgical treatment of vulval cancer
18. Title: The role of inherited and acquired thrombophilia in reproductive health
19. Title: The role of lymphadenectomy in the treatment of endometrial cancer
20. Title: The role of preoperative MRI in cervical cancer
21. Title: Trends in operative delivery
   Tutor: Róbert Póka M.D., Dr. habil., Ph.D.

22. Title: Meiotic abnormalities and their clinical significance in human reproduction
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<td>23. Title: Role of Doppler ultrasound in antenatal care</td>
<td>Tamás Szilveszter Kovács M.D., Ph.D.</td>
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<td>24. Title: Anovulatory infertility</td>
<td>Attila Jakab M.D., Ph.D. habil.</td>
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<td>25. Title: Examination of genetic concerns about the safety of assisted reproduction</td>
<td>Alpár Gábor Juhász M.D., Ph.D.</td>
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<td>26. Title: Role of antimullerian hormone (AMH) in clinical practice</td>
<td>Zoárd Krasznai M.D., Ph.D.</td>
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<td>27. Title: Ultrasound dating in pregnancy</td>
<td>Péter Török M.D., Ph.D.</td>
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<td>28. Title: Vaginal Birth After Cesarean</td>
<td>Rudolf Lampé M.D., Ph.D.</td>
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<td>29. Title: Cervical cancer prevention: the role and the future of HPV vaccination besides conventional screening</td>
<td>Zoárd Krasznai M.D., Ph.D.</td>
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<td>30. Title: New treatment strategies in ovarian cancer</td>
<td>Róbert Póka M.D., Dr. habil., Ph.D.</td>
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<td>31. Title: Role of endoscopy in infertility work-up</td>
<td>Balázs Erdődi M.D.</td>
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<td>32. Title: Pregnancy care in PCOS patients</td>
<td>Zoltán Hernádi M.D., Ph.D., D.Sc.</td>
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<td>33. Title: Special aspects of pregnancy care in patients with endocrine disorders</td>
<td>László Módis M.D., Ph.D., D.Sc.</td>
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<td>34. Title: Thyroid autoimmunity - clinical significance, prevention and treatment in human reproduction</td>
<td>Judit Damjanovich M.D., Ph.D.</td>
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<td>35. Title: Transvaginal hydrolaparoscopy - a new method</td>
<td>Valéria Nagy M.D., Ph.D.</td>
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<td>36. Title: Hysteroscopic treatment of different gynecologic pathologies</td>
<td>Lili Takács M.D., Ph.D.</td>
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<td>37. Title: White blood cell function in preeclampsia</td>
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<td>38. Title: Contraception in the 21st century</td>
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<td><strong>Division of Gynecological Oncology</strong></td>
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<td>1. Title: Chemotherapy of ovarian cancer</td>
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<td>2. Title: Prognostic relevance of HPV-infection in cervical cancer</td>
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<td>4. Title: The prognostic role of CA-125 in ovarian cancer</td>
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<td>5. Title: Chemotherapy of cervical cancer</td>
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<td>7. Title: Epidemiology of metastatic ovarian cancer</td>
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<td><strong>Department of Ophthalmology</strong></td>
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<td>2. Title: Surgical treatment of dry eye</td>
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<td>3. Title: Intraocular tumors</td>
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<td>4. Title: Ocular clinical signs in rare diseases</td>
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<td>5. Title: Corneal dystrophies</td>
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<td>6. Title: Stem cells of the cornea</td>
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<td>7. Title: Nuclear medicine measurements in the inflammatory disorders of the eye’s anterior segment</td>
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<td>8. Title: Prospective study of vascular pathogenesis of eye diseases associated to rheumatologic and immunologic disorders</td>
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<td>9. Title: Tear cytokine measurements in inflammatory diseases of the anterior segment of the eye associated to immunological and</td>
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autoimmunological disorders
10. Title: Tear-clearance measurements in dry eye syndrome with dacryoscintigraphy
   Tutor: Ádám Kemény-Beke M.D., Ph.D.

11. Title: Contact lens wear and complications
12. Title: Cosmetical contact lenses
   Tutor: Beáta Kettesy M.D., Ph.D.

13. Title: Corneal measurements with Pentacam
14. Title: Refractive laser-surgical interventions
   Tutor: Bence Lajos Kolozsvári M.D., Ph.D.

15. Title: Color Doppler in the follow-up of choroidal melanoma after brachytherapy
16. Title: Subtenon TCA in the treatment of radiogen retinopathy
   Tutor: Éva Surányi M.D.

17. Title: Graves' orbitopathy - current concepts in diagnosis and therapy
18. Title: Pathogenesis of Graves' orbitopathy
   Tutor: Bernadett Ujhelyi M.D., Ph.D.

19. Title: Assessing the safety and efficacy of intravitreal ranibizumab as a preoperative adjunct treatment before vitrectomy surgery in severe proliferative diabetic retinopathy (PDR) compared to standard vitrectomy alone
20. Title: Evaluate and demonstrate the results of the Hungarian Lucentis National Patient Registry
   Tutor: Attila Vajas M.D.

21. Title: Congenital ptosis peculiar associated movements of the affected lid
22. Title: Diagnosis and therapy in retinopathy of prematurity
23. Title: Non-surgical and surgical therapy of congenital ptosis
   Tutor: Annamária Nagy M.D.

24. Title: Ocular manifestations of Weill-Marchesani syndrome
25. Title: Pellucid marginal degeneration
   Tutor: Mariann Fodor M.D., Ph.D.

26. Title: BCVA change after intravitreal ranibizumab injection
27. Title: IOP change after intravitreal ranibizumab injection
   Tutor: Erika Papp M.D.

Department of Orthopedic Surgery
1. Title: The role of arthrodesis in the treatment of degenerative arthritis of the knee.
2. Title: Treatment options in knee instability.
   Tutor: Henrik Rybaltovszki M.D.

Department of Otorhinolaryngology and Head and Neck Surgery
1. Title: The role of cochlear implant in hearing rehabilitation
2. Title: The role of the bone anchored hearing aids and the cochlear implantation in hearing rehabilitation
   Tutor: László Tóth M.D., Ph.D. habil.

3. Title: Analysis of the aetiology and pathomechanism of the development of the otitis media with effusion
4. Title: Modern aspects of tonsillectomy versus tonsillotomy
5. Title: Rehabilitation of speech after total laryngectomy
6. Title: The effectiveness of surgical treatment of focal oto-rhino-laryngological diseases on dermatologic diseases
7. Title: The role of middle and inner ear implants in the rehabilitation of hearing
8. Title: The utility of the neuromonitor during surgeries of the big salivary glands
   Tutor: Szilárd Gyula Rezes M.D., M.Sc., Ph.D.

Department of Pediatrics
1. Title: Contemporary treatment approaches of children with Hemophilia A
   Tutor: Csongor Kiss M.D., Ph.D., D.Sc.

2. Title: Adding an Electrocardiogram to the Pre-participation Examination in Competitive Athletes. Review.
   Tutor: Gábor Mogyorósy M.D., Ph.D.

3. Title: Malformations of the central nervous system in the newborns.
   Tutor: Andrea Nagy M.D.
4. Title: Clinical diagnosis, genetical background and treatment of vitamin-D resistant hypophosphatemic rickets
   Tutor: Tamás Szabó M.D., Ph.D.

5. Title: Fungal infections in malignant hematology
   Tutor: István Szegedi M.D., Ph.D.

6. Title: Experience with tissue adhesives in lip cleft surgery
   Tutor: Ágnes Magyar M.D.

7. Title: Open versus thoracoscopic approach in the treatment for esophageal atresia
   Tutor: László Sasi Szabó M.D.

8. Title: Quality of life in chronic pediatric diseases
9. Title: Type 2 diabetes mellitus in childhood, growing incidence
   Tutor: Enikő Felszeghy M.D., Ph.D.

Department of Physical Medicine and Rehabilitation
1. Title: Testing the effectiveness of the upper-extremity repetitive task practice and forced aerobic training added to ergotherapy to improve upper limb and cognitive functions
2. Title: The efficiency test of the electromyogram-triggered FES treatment in hemiparetic patients and the visual feedback training in the development of upper limb functions
3. Title: The relationship of physiological and functional changes observed in complex rehabilitation programs (obesity and stroke rehabilitation) with adipocytes
   Tutor: Zoltán Jenei M.D., Ph.D.

Department of Psychiatry
1. Title: The dietetic and gastroinvestinal basis of autism
   Tutor: Csaba Móré E. M.D., Ph.D.

2. Title: Cognitive theory and therapy of depression
3. Title: Cognitive theory and therapy of generalized anxiety disorder
4. Title: Effectiveness of Cognitive Behaviour Therapy in OCD
5. Title: Effectiveness of schema therapy in personality disorders
6. Title: Emotion dependent and independent cognitive functions in unipolar depression
7. Title: Significance of disfunctional attitudes in depression and anxiety disorders
8. Title: Theory of mind and mentalization deficits in patients with personality disorders
   Tutor: Anikó Égerházi M.D., Ph.D.

10. Title: The psychosocial effects of obesity
    Tutor: Katalin Tolvay M.D.

11. Title: Brain imaging in psychiatry.
12. Title: Oxidative stress and chronic inflammation in psychiatric disorders
13. Title: Post-traumatic stress disorder and post-traumatic growth.
14. Title: The neurobiology of depression.
15. Title: The role of microbiota in mental health
16. Title: The therapeutic potentials of psychedelics
    Tutor: Ede Frecska M.D., M.A., Ph.D.

Department of Pulmonology
   Tutor: Andrea Fodor M.D.

2. Title: New perspectives in the treatment of community acquired pneumonia
   Tutor: László Brugós M.D., Ph.D.

3. Title: The role of bronchoscopy in the therapy of lung cancer
   Tutor: Imre Varga M.D., Ph.D.

4. Title: Modern Therapy of NSCLC
   Tutor: Tamás Kardos M.D.

5. Title: Immunotherapy induced endocrinopathy in NSCLC
6. Title: Soliter metastasis and survival in NSCLC  
Tutor: Nóra Bittner M.D., Ph.D.

**Department of Surgery**

1. Title: Surgical treatment of Graves disease with ophthalmopathy  
Tutor: Ferenc Győry M.D.

2. Title: Surgical treatment of bowel obstruction in colorectal diseases  
Tutor: László Damjanovich M.D., Ph.D., D.Sc.

3. Title: Surgical and endovascular interventions in critical limb ischemia  
Tutor: Sándor Olvasztó M.D.

4. Title: Histopathologic examination of the carotid plaques regarding their possible prognostic value  
Tutor: Krisztina Litauszky M.D.

5. Title: Liver resections for metastases of colorectal cancer  
Tutor: János Pósán M.D.

6. Title: Prevention of bronchial stump insufficiency after lung resections  
Tutor: István Takács M.D., Ph.D.

7. Title: The surgical treatment of hyperparathyroidism  
Tutor: Roland Fedor M.D., Ph.D.

8. Title: Different forms of hereditary colorectal cancer among our patients.  
Tutor: Miklós Tanyi M.D., Ph.D.

9. Title: Mesh implantation in the surgical treatment of thoracic defects  
Tutor: Attila Enyedi M.D.

**Division of Operative Techniques and Surgical Research**

1. Title: Anesthesia in experimental animals (for Medicine and Pharmacy students)  
Tutor: Ádám Deák D.V.M., Ph.D.

3. Title: Laser-Doppler in experimental surgery (for Medicine students)  
Tutor: Norbert Németh M.D., MBA, Ph.D.

4. Title: Changes of red blood cell mechanical stability in surgical pathophysiological processes (for Medicine and Dentistry students)  
Tutor: Norbert Németh M.D., MBA, Ph.D.

5. Title: Investigation of hemorheological and microcirculatory changes in ischemia-reperfusion, including therapeutical possibilities (for Medicine students)  
Tutor: Norbert Németh M.D., MBA, Ph.D.

6. Title: Hemostatic agents (bioplasts) in surgery (for Pharmacy students)  
Tutor: Norbert Németh M.D., MBA, Ph.D.

7. Title: Ischemia-reperfusion injury and its prevention with different methods - experimental models (for Medicine students)  
Tutor: Katalin Pető M.D., Ph.D.

8. Title: Analysis for laparoscopic skills assessment  
Tutor: Katalin Pető M.D., Ph.D.

9. Title: Hand hygiene and surgical scrub (for Medicine students)  
Tutor: Katalin Pető M.D., Ph.D.

10. Title: Instruments and devices used in pharmacological care (for Pharmacy students)  
Tutor: Norbert Németh M.D., MBA, Ph.D.

11. Title: Basic Microsurgical Training course at the Microsurgical Education and Training Center of the Department of Operative Techniques and Surgical Research  
Tutor: Norbert Németh M.D., MBA, Ph.D.

12. Title: Famous surgeons: William Halsted. Halsted principles. (for Medicine students)  
Tutor: Irén Mikó M.D., Ph.D.

**Department of Urology**

1. Title: Role of laparoscopy in urology  
Tutor: Tibor Flaskó M.D., Ph.D.

2. Title: Assessment of urinary incontinence  
Tutor: László Lőrincz M.D.

3. Title: Different topics regarding prostate and kidney cancer  
Tutor: Csaba Berczi M.D., Ph.D.
4. Title: Bladder replacement after radical cystectomy  
Tutor: Antal Farkas M.D., Ph.D.

5. Title: Different topics regarding andrology  
Tutor: Mátyás Benyó M.D., Ph.D.

6. Title: Pathology of clear cell renal cancer  
Tutor: Krisztián Szegedi M.D.

7. Title: Treatment of urethral stricture  
Reconstructive urological surgeries  
Tutor: Mihály Murányi M.D.

8. Title: Assessment of bening prostate hyperplasia  
Tutor: József Zoltán Kiss M.D.

9. Title: Effect of orchidopexy on male fertility  
Tutor: Gyula Drabik M.D.

Department of Pharmacology
1. Title: Antibiotics and their application  
2. Title: Antitumor agents and applications  
3. Title: Asthma and antiasthmatic agents  
4. Title: Degenerative disorders and treatments in the central nervous system  
5. Title: Hypercholesterolemia and pharmacotherapy  
6. Title: Hypertension and treatments  
7. Title: Inflammation and nonsteroid and steroid antiinflammatory drugs  
8. Title: Optional title in cardiovascular pharmacology.  
9. Title: Sleep disorders, sedation and treatments  
10. Title: The blood and its pharmacological interventions  

11. Title: Free topic from instrumental analytical chemistry.  
12. Title: Gaseous „messengers” (NO, CO, H2S, CH4) in the treatment of ischemic heart diseases.  
13. Title: Model systems used in drug metabolism studies.  
14. Title: Sampling and sample preparation used in the analysis of drug substances.  
15. Title: Treatment of heart failure.

16. Title: Treatment of ischemic heart diseases.  
Tutor: István Bak M.Sc., Ph.D. habil.

17. Title: Diuretics and their application  
18. Title: Hemeoxygenase/CO system and autophagy (experimental)  
19. Title: Pharmacotherapy an pregnancy  
20. Title: Pharmacotherapy in childhood  
21. Title: Pharmacotherapy in elderly patient  
Tutor: István Lekli D.Pharm., Ph.D.

22. Title: Pharmacologic therapies in Gastrointestinal Diseases  
23. Title: Pharmacotherapy in diabetes  
24. Title: The role of autophagy in hem toxicity  
Tutor: Alexandra Gyöngyösi Ph.D.

Department of Pharmaceutical Technology  
1. Title: Nanoparticles and their potential for application in bone.  
2. Title: The connection between the regulation of the endocrine and the immune system.  
Tutor: Miklós Vecsényes D.Pharm., Ph.D.

3. Title: Biocosmetics.  
4. Title: Pharmaceutical care. Selected chapters from pharmaceutical care, creating and evaluate questionnaires.  
5. Title: Pharmaceutical Communication Skills. Description of problems.  
6. Title: Pharmaceutical technology. Modified-Release Therapeutic systems.  
Tutor: Ildikó Bácskay D.Pharm., Ph.D.

7. Title: Examination of the antioxidant effect of (natural) substrates on HaCaT keratinocyte cell line.  
8. Title: Formulation of creams and topical SMEDDS (self-microemulsifying drug delivery systems).  
Tutor: Pálma Fehér D.Pharm.

9. Title: Examination of natural substrates. Examination of biological effect on cell cultures and biological barriers especially polyphenols.
<table>
<thead>
<tr>
<th>Title</th>
<th>Tutor</th>
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<tbody>
<tr>
<td>11. Title: Drug absorption: problems, improvement and models.</td>
<td>Ferenc Fenyvesi D.Pharm., Ph.D.</td>
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<tr>
<td>12. Title: Modified-release solid dosage forms.</td>
<td>Zoltán Ujhelyi D.Pharm., Ph.D.</td>
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<td>Department of Pharmaceutical Chemistry</td>
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<td>1. Title: Synthesis of new teicoplanin aglycon derivatives</td>
<td>Pál Herczegh Ph.D., D.Sc.</td>
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<td>2. Title: Bisphosphonate drugs (literature compilation)</td>
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<td>3. Title: Newly approved antibiotics (literature compilation)</td>
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<td>4. Title: Synthesis of antiviral molecules</td>
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<td>5. Title: The history of ristocetin and ristocetin aglycon (literature compilation)</td>
<td>Ilona Bakai-Bereczki Ph.D.</td>
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<td>6. Title: Oral anticoagulants (literature compilation)</td>
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<td>7. Title: Sulfated oligosaccharides as inhibitors of angiogenesis, tumor growth, and metastasis saccharides (literature compilation)</td>
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<td>8. Title: Synthesis of thio-linked glycomimetics by photoinduced hydrothiolation of glycals</td>
<td>Anikó Borbás Ph.D., D.Sc.</td>
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<td>9. Title: Application of thiol-addition in the synthesis of glycoconjugates</td>
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<td>10. Title: Synthesis of chimera-type antibiotics</td>
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<td>11. Title: Synthesis of potential ligands of bactericidal lectines</td>
<td>Magdolna Csávás Ph.D.</td>
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<td>12. Title: Efficient synthesis of idose/iduronic acid monosaccharide building blocks</td>
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<td>13. Title: Synthesis and biological study of sulfonic-acid containing maltooligomers</td>
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<td>14. Title: Synthesis and characterisation of carbohydrate based nitrogen containing tricycles</td>
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<td>15. Title: Synthesis of heparin analogue anticoagulant oligosaccharides</td>
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<td>16. Title: Synthesis of multivalent dirhamnoside derivatives</td>
<td>Mihály Herczeg Ph.D.</td>
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<td>Department of Pharmaceutical Surveillance and Economics</td>
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<td>1. Title: Interactions in the practice of Pharmacovigilance by the aspects of a patient</td>
<td>Béla Tóth E. M.D., MBA, Ph.D.</td>
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<td>2. Title: The practice of pharmacovigilance by the aspects of pharmacists and physicians</td>
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<td>3. Title: Theory and practice of risk evaluation and risk management</td>
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<td>Department of Biopharmacy</td>
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<tr>
<td>1. Title: Any subject from the field of biopharmacy</td>
<td>Gábor Halmos D.Pharm., Ph.D.</td>
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</table>
(1) The thesis topics, and names of the supervising teachers are available in the faculty bulletin, in the program description and on the website of the faculty.

(2) The Educational Units [departments] put together the list of theses to be announced (with the names of the consultants), which is included in the program description. The student is to choose from this list, and any deviation from it, has to be approved by the heads of the aforementioned Educational Units. The student is required to choose the topic of his/her thesis before the last week of the second semester in the fourth academic year. In case the student intends to choose an experimental topic, he/she is expected to declare it before the last week of the first semester of the fourth academic year. The titles of the thesis must be submitted to the Dean’s Office in the last week of the first or second semester of the fourth academic year.

(3) The thesis can be done as part of research under the auspices of the Students' Scientific Association (SSA). An essay can be accepted as a thesis, on condition it has been acknowledged by the panel of judges of the local SSA conference as a thesis and thereby the specific essay was graded ‘excellent’; in case of an essay with multiple authors it can be accepted as a thesis in its original form if the declaration of waiver by the other authors is attached. The documents regarding the acceptance of the thesis (evaluations, answers) must be submitted in an attachment. It is also necessary to fill in and submit a questionnaire containing details (title, authors, departments, supervisors) of the essay and SSA presentation.

(4) The deadline to submit the thesis at the Faculty of Pharmacy is three months before the written final exam. In case the student fails to do this by the deadline, he/she can take his/her comprehensive exams, but cannot take the state exam. The deadline to submit the thesis can be postponed up to two weeks in specific cases, with the supervisor’s suggestion and with the permission from the head of the Education Committee.

(5) The thesis must be submitted in two copies at the Education Office and electronically uploaded to the electronic archive of the University and National Library of the University of Debrecen before the beginning of the written final exam. It should not exceed 40 typed pages in length. The typed or word processed and printed thesis must be submitted bound and in an aesthetic design. Margins must be 2.5 cm at the top and bottom, and 3 cm on the left and right. Its structure and the process of evaluation must meet requirements as follows:

a) The thesis can outline the author’s own experimental activities; it can be a case study, a clinicopathological or statistical analysis or even a summary of scientific literature. It should not necessarily contain new scientific results but is should definitely sum up the author’s individual work in a specific field. Results other than the author’s own should be specified exactly. The front page should contain information as follows: the title of the thesis, author’s name, supervisor’s name, name of the educational unit in which the thesis was written, name of the head of department and date of accomplishment. The thesis can be submitted in the possession of signatures from the supervisor and head of department. (Specimen documents/forms can be downloaded from the homepage of the Faculty). Introduction, aims, results and discussion should be arranged in separate chapters. Furthermore, the thesis should also contain a summary (of maximum two printed pages). Bibliographic information should be organized as follows: authors’ names (first names by initials), full title of publication, name of journal where it appeared, number of volume, page(s) and year of publication. In case a book is referred to, the name(s) of the book’s author(s) and of the publisher should both be provided. The number of references should fall in the range of 20-50 publications.

b) On evaluating a thesis, referees will consider its logical organization and professional relevance,
the methods applied and the accuracy through which results have been presented.
c) The supervisor of the thesis will evaluate the author’s professional activities and, together with
the thesis, submit the written evaluation in two copies to the Education Office and the person(s) in
charge at the specific department. (Specimen documents/forms can be downloaded from the
homepage of the Faculty).
d) The submitted thesis will be allocated to two referees at the official request of a professional
board appointed by the Educational Committee of the Faculty. In case a referee fails to fulfil his
commitment, he should return the thesis to the Education Office without delay. Referees should
prepare and send two printed copies of their written evaluation to the Education Office, while the
electronic version should be sent to both the Education Office and student (author) within two
weeks of submission. If neither referee accepts the thesis, the student has to re-write it with due
consideration of the critical remarks made by the referees. If only one of the two referees accepts
the thesis, it should be allocated to a third judge whose opinion will be exclusively considered in the
future. A candidate can orally defend his/her thesis if both referees have accepted it.
Students will get a written evaluation from the referees and they must respond – even if they agree
with the remarks – in both written and electronical form within one week of receipt and send their
(written) response to both the Education Office and referees. Referees should electronically declare
their acceptance of the student’s response within five days.
The thesis must be defended in the educational unit in which the topic was announced, in front of
thesis defense committees appointed by the Dean’s Office. The defense itself will take place in front
of a committee including three members. The chairperson of the defense committee should be a
head tutor of the faculty, while the members are selected as follows: one of the certified tutors of
the faculty and a person keeping the minutes, the head of the education unit or a head tutor
(chairperson) appointed by him/her, and the referees. The supervisor and the referees must be
invited to participate at the event of defense. The committee evaluates the thesis in a closed session.
A thesis defense report is made in three copies containing the student’s name, the title of the thesis,
date and place of defense and the mark/grade approved by the committee. One of the copies belongs
to the educational unit of the faculty, the other two are sent to the Education Office by the institute.
One copy of the thesis shall be kept in the educational unit of the faculty for five years, one copy is
returned to the student and one copy is sent to the Kenézy Library where it can be read but not
borrowed.
The following should be attached to the thesis:
the supervisor’s report which is the written evaluation of the candidate
a summary of the thesis with name and title
plagiarism declaration form in which the student declares that the thesis is his/her own work
a request for limited access to thesis form - if needed
The final exam (test) consists of a practical and oral part.
The chair and the members of the committee are appointed by the Dean or the Vice Dean.
The date of the written state exam is appointed by the Ministry of Education.
The dates of the practical and oral state exams are assigned by the Dean’s Office. The exam is
conducted in front of a state examining committee of three to five people. The examination
committee at the practical final exam at the Faculty of Pharmacy consists of two tutors of the
university appointed by the Dean’s Office. The examination board at the theoretical exam is
presided by a recognized scientist in the field of pharmacy, while the members are two head tutors
of the Faculty and a person keeping the minutes. The Dean’s Office can appoint more than one
examination board to conduct simultaneous theoretical exams.
<table>
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<tr>
<th>List of Textbooks</th>
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<tr>
<td><strong>BMC</strong></td>
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<tr>
<td><strong>Hungarian Language for BMC students:</strong></td>
<td>Gerő Ildikó-Kovács Judit: Színesen magyarul. 2017.</td>
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<td><strong>SBMC</strong></td>
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<tr>
<td><strong>1st year Hungarian Crash Course:</strong></td>
<td>Gerő Ildikó-Kovács Judit: Színesen magyarul. 2017.</td>
</tr>
</tbody>
</table>
CHAPTER 24


 **General Chemistry Practice:**
 J. McMurry, R. C. Fay: General Chemistry.

 **Pharmaceutical Biology I.:**

 **Latin Language I.:**
 Takácsné Tóth Emőke: Latin for Pharmacy Students.
 Debrecen. 2012.

 **Computer Science:**
 Greg Perry: Microsoft Office.

 **Hungarian Language I/1.:**

 **Latin Language II.:**
 Takácsné Tóth Emőke: Latin for Pharmacy Students II.
 Debrecen. 2012.

 **Inorganic and Qualitative Analytical Chemistry Theory:**
 G. Svehla (revisor): Vogel's qualitative inorganic analysis.
 N. N. Greenwood and A. Earnshaw: Chemistry of the elements.
 T. Moeller, R. O'Connor: Ions in Aquenous Systems, an introduction to chemical equilibrum and solution chemistry.

 **Inorganic and Qualitative Analytical Chemistry Practice:**
 G. Svehla (revisor): Vogel's qualitative inorganic analysis.
 N. N. Greenwood and A. Earnshaw: Chemistry of the elements.

 **Biophysics:**
 Biophysics laboratory manual.
 Department of Biophysics and Cell Biology, 2001.
 M. Shinitzky: Biomembranes. Physical aspects.
 Edited by János Szöllösi: Medical Biophysics.
 Medicina, 2009.
 Materials.
LIST OF TEXTBOOKS

URL: www.biophys.dote.hu
Textbook online.
URL: http://www.biophysics.org/education/resources.htm

Physical Chemistry I.: 
Peter Atkins and Julio de Paula: Physical chemistry for life sciences.
R. Chang: Physical chemistry with applications to biological systems.
P. W. Atkins, J. de Paula: Elements of Physical Chemistry.

Organic Chemistry Theory I.: 
E. L. Eliel, S. H. Wilen: Stereochemistry of organic compounds.
J.A. Miller, E.F. Neuzil: Modern Experimental Organic Chemistry.

First Aid and Reanimation: 
József Betlehem: First Things to Be Done in Emergencies – Providing First Aid for Health Professionals.
Medicina Könyvkiadó Zrt., 2012.

Pharmaceutical Biology II.: 
Practical Courses in Genetics.
University Medical School of Debrecen, 2002.
Tom Strachan, Andrew P. Read: Human Molecular Genetics.
Robert L. Nussbaum, Roderick R. McInnes,
Csaba Szalai, Valéria László, Sára Tóth, Erna Pap, András Falus: Medical genetics and genomics.
URL: https://elearning.med.unideb.hu

Hungarian Language I/2.: 
Győrffy Erzsébet-Mezei Zsuzsa Livia: Magyarules.
2018.

Pharmaceutical Anatomy: 
T. W. Sadler: Langman's Medical Embriology.
Sobotta: Atlas of Human Anatomy I.–II.
L.P. Gartner: Concise Histology.

2nd year
Hungarian Language II/1.:
Fodor Marianna - Rozman Katalin: Beszélek magyarul?! I.

Organic Chemistry Theory II.:
E. L. Eliel, S. H. Wilen: Stereochemistry of organic compounds.
J.A. Miller, E.F. Neuzil: Modern Experimental Organic Chemistry.

Quantitative Analytical Chemistry I.:
Harris, D. C.: Quantitative Chemical Analysis.

Human Physiology I.:
A. Fonyó: Principles of Medical Physiology.

Pharmaceutical Biochemistry I.:

Physical Chemistry II. :
Katalin Ösz, Attila Bényei: Physical Chemistry Laboratory Measurements (for students of Pharmacy, Chemistry and Chemical Engineering).
Egyetemi Kiadó, 2011.
Peter Atkins and Julio de Paula: Elements of Physical Chemistry.
Dr. Katalin Ösz, Dr. Attila Bényei: Physical Chemistry (practice information).
URL: http://fizkem.unideb.hu/physchem.html

Colloid and Surface Chemistry Theory:
Pashley, RM, Karaman, ME: Applied and Surface Chemistry.
Barnes, GT, Gentle, IR: Interfacial science.
Cosgrove T.: Colloid Science.

Colloid and Surface Chemistry Practice:
Pashley, RM, Karaman, ME: Applied and Surface Chemistry.
Barnes, GT, Gentle, IR: Interfacial science.
Cosgrove T.: Colloid Science.
URL: http://fizkem.unideb.hu/

Hungarian Language II/2.:
Fodor Marianna-Rozman Katalin: Beszélek magyarul?! II.
<table>
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<tr>
<th><strong>LIST OF TEXTBOOKS</strong></th>
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