CHAPTER 1

ACADEMIC PROGRAM FOR THE 1ST YEAR

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.


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:

Practical:

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
CHAPTER 1


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

Special rules in an emergency situation 2019-2020 year/2nd semester

Necessary condition for getting the signature:
Studying the e-learning material supplied in a weekly basis according to the timetable.

End-semester examinations
End-semester exam: The end-semester exam is a written test exam, which is composed of thirty questions related to anatomy, histology and embryology. The test covers the topics of lectures, practices and 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)

Department of Foreign Languages

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

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
Chapter 1

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.

Special regulations regarding the state of emergency in the second semester of the 2019-2020 academic year.

The material and tasks to be studied and fulfilled based on the course book will be uploaded weekly by each group’s own teacher. Students have to complete the assignments before the deadline set by their teacher. The teachers will provide an answer key after each unit. Joining the webinars is optional for the students. A weekly test will be uploaded on the e-learning site. It is compulsory for the students to hand in six of the eight weekly tests on time.
Requirement for obtaining the signature: Six completed weekly tests. Submission of the self control tests will account for attendance. If the number of tests not submitted is more than two, the signature will be refused and the student has to repeat the course.
The time and date of the end-term test (both written and oral) will be announced after the lifting of restrictions.

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>
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<tr>
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</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.

*Special regulations regarding the state of emergency in the second semester of the 2019-2020 academic year*

The material and tasks to be studied and fulfilled based on the course book will be uploaded weekly by each group’s own teacher. Students have to complete the assignments before the deadline set by their teacher. The teachers will provide an answer key after each unit. Joining the webinars is optional for the students.
A weekly test will be uploaded on the e-learning site. It is compulsory for the students to hand in six of the eight weekly tests on time.
Requirement for obtaining the signature: Six completed weekly tests. Submission of the self control tests will account for attendance. If the number of tests not submitted is more than two, the signature will be refused and the student has to repeat the course.
The time and date of the end-term test (both written and oral) will be announced after the lifting of restrictions.
DEPARTMENT OF HUMAN GENETICS

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

1st week:
**Lecture:** (1) Prokaryotic and eukaryotic cell cycle and cell division. (2) Mitosis and meiosis. (3) Cytogenetics I. Karyogram, ideogram, banding techniques. Human autosomal trisomies.
**Practical:** Seminar: Introduction to genetics. Cell division.

2nd week:
**Practical:** Seminar: Cytogenetics.

3rd week:
**Lecture:** (7) Recombination of non-allelic genes. (8) Gene interactions. Mitochondrial inheritance. (9) Human mendelian traits and diseases. Inborn errors of metabolism I.
**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:
**Lecture:** (16) Transformation, transduction. (17) Conjugation in bacteria, plasmids. (18) Gene regulation in eukaryotes I.
**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.
**Practical:** Seminar: Gene regulation, operons. Bacterial genetics. Mutation and polymorphisms.

9th week:
**Lecture:** (25) Modern genetic engineering methods and their application. (26) Developmental genetics. (27) Molecular genetics of the cell cycle.
**Practical:** Seminar: Eukaryotic gene regulation.

10th week:
**Lecture:** (28) Cancer genetics. (29) Population genetics.
**Practical:** Seminar: Recombinant DNA. Self Control Test (2nd self-control test in extra time.)
<table>
<thead>
<tr>
<th>11th week:</th>
<th></th>
<th>13th week:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture:</strong> (30) Evolutionary genetics. (31) Pharmacogenetics, pharmacogenomics.</td>
<td></td>
<td><strong>Lecture:</strong> (34) Systembiological approach to disease. (35) Network analysis.</td>
</tr>
<tr>
<td><strong>Practical:</strong> Detection of human polymorphism by polymerase chain reaction. (Laboratory practical.)</td>
<td></td>
<td><strong>Practical:</strong> Seminar: Cell cycle regulation and cancer.</td>
</tr>
<tr>
<td>12th week:</td>
<td></td>
<td>14th week:</td>
</tr>
<tr>
<td><strong>Lecture:</strong> (32) Ecogenetics and ecogenomics. Genetic polymorphism of human populations. (33) Genomics, proteomics, the human genome project.</td>
<td></td>
<td><strong>Practical:</strong> Seminar: Genomics. Self Control Test (3rd self-control test in extra time.)</td>
</tr>
<tr>
<td><strong>Practical:</strong> Transformation of Escherichia coli. PCR evaluation of the human polymorphism experiment. (Laboratory practical.)</td>
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</table>

**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>
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<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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<tr>
<td>68.00 - 71.99</td>
<td>8</td>
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<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

Special rules applied to emergency situation during the second semester of academic year 2019/2020

The conditions of getting a signature for the subject are to download the practical materials uploaded to the e-Learning page of the subject, to participate in the seminars, and to join to the online seminars in an identifiable way. In case of more than four absences in total, the signature is refused (there will be no lab test).
In this semester there will be no mid-term tests, but students will receive assignments, which they must send back to e-mail address. A total of 10 bonuses can be earned for the assignments which will be added as a percentage to the result of the final exam. All other rules remain unchanged.

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).
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
ACADEMIC PROGRAM FOR THE 1ST YEAR

9. Detection and confirmation of SO and HS gases (SO + KIO, HS + Pb(NO) and PbS + HO)).

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).
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).

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).

Practical:
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).

**Practical:**
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).

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.

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 II nd 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–; P2O73–; 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).
5. Reactions of the members of II nd 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–; P2O73–; HPO42–; H2PO4–; F–; BrO3–; IO3–).

**Voluntary test**
-The same as unknown sample, but solution is given.
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–; SO32–; SO42–; PO43–; HPO42–; H2PO4–; 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–; SO32–; SO42–; 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**

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

8th week:

**Seminar:**

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–; SO32–; PO43–; (HPO42–; H2PO4–; F–; BrO3–; IO3–; Cl–; Br–; I–; SO32– and SO42– ions do not coexist).

**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

**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–; SO32–; PO43–; (HPO42–; H2PO4–; F–; BrO3–; IO3–; Cl–; Br–; I–; SO32– and SO42– ions do not coexist).

**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
CHAPTER 1

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).

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

10th week:

**Seminar:**
1. Sanger – Black’s test for trace analysis of arsenic impurity in solution (demonstration).

**Purity test**
2. Investigation of iron impurity in citric acid.

**Unknown sample**
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).

**Voluntary test**
- Detection of one or two cations of group I and IIA in solution (Hg22+ – Hg2+ and Cu2+ – Hg22+ ions are not given together).

**Demonstrations taken from the lectures**
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.

11th week:

**Seminar:**
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).

2. “Fluoride test” for aluminium (demonstration).

3. Detection of traces of nickel in cobalt salts.
4. Preparation and properties of cyanide complexes of some transition metal ions (S.I. Practice 11).

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).

**Unknown sample**
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).

**Voluntary test**
- 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).

**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).  
2. “Fluoride test” for aluminium (demonstration).  
3. Detection of traces of nickel in cobalt salts.  
4. Preparation and properties of cyanide complexes of some transition metal ions (S.I. Practice 11).  
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). 

Unknown sample  
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). 

Voluntary test  
- 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). 

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 

Practical: 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+; Hg2+; Pb2+; Bi(III); Ni2+; Co2+; Fe2+; 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: CO3\(^{2-}\)\;(HCO3\(^{-}\)); SO4\(^{2-}\); PO4\(^{3-}\)\;(HPO4\(^{2-}\), H2PO4\(^{-}\)); F\(^{-}\); Cl\(^{-}\); Br\(^{-}\); I\(^{-}\); NO3\(^{-}\)– The various protonated forms of the anions cannot be identified.

4. Inventory and return of laboratory equipments.

**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 (Cu\(^{2+}\); Ag\(^{+}\); Cd\(^{2+}\); Hg\(^{2+}\); Pb\(^{2+}\); Bi(III); Ni\(^{2+}\); Co\(^{2+}\); 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: CO3\(^{2-}\)\;(HCO3\(^{-}\)); SO4\(^{2-}\); PO4\(^{3-}\)\;(HPO4\(^{2-}\), H2PO4\(^{-}\)); F\(^{-}\); Cl\(^{-}\); Br\(^{-}\); I\(^{-}\); NO3\(^{-}\)– 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.

**Special rules of procedure during the state of emergency in the second semester of 2019/2020 school year**

According to the regulations of the University of Debrecen the course is organized as distance learning from 23rd March 2020 until its withdrawal. The distance learning platform is the elearning system (elearning.unideb.hu), where the lecture course can be found and an automatic Neptune enrollment takes place. Upon entering the elearning.unideb.hu system, the student registered earlier in Neptun automatically becomes a participant of the course, where a Forum for consultations has also been created. Lecturers publish course materials or their access path in the distance learning system as well as the information connected with technical implementation of distance lessons and assessment of results.

The content of the curriculum to be taught does not change, the provisions of the accepted syllabus at the beginning of this semester shall continue to apply. However the way of learning is adapted to technical possibilities. Attendance at lectures is not mandatory, participation in seminars is logged by the elearning system. Moodle courses may be used for their own learning purposes but may not be shared or disseminated by students on the Internet.

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

Year, Semester: 1st year/2nd semester
Number of teaching hours: Lecture: 42
1st week:

2nd week:

3rd week:
**Lecture:** Nitrogen, phosphorus, arsenic, antimony and bismuth (Group 15). Atomic and physical properties, distribution, chemical properties of the elements. Typical compounds, comparison of the stereochemistry of nitrogen and phosphorus. Hydrides, preparation and uses of ammonia. Structure, chemical properties of the oxides and oxoacids. Production and uses of the elements.

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:

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:
Lecture: Biological functions of alkali and alkaline earth metal ions. Transition metals and other elements. Transport, storage and activation of oxygen. Role and metabolism of iron. Copper containing proteins and metabolism of copper. Biological role of zinc in activation of enzymes. Importance of Mo, Se and silicon. Medical applications: diagnosis and therapy. Toxicity of
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. Separation of organic compounds with liquid-liquid extraction.
Practical: • Liquid-liquid extraction. • Isolation of caffeine from tea leaves. (p. 65.) • Separation of 1,3-dinitrobenzene 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.

**Special rules for the state of emergency in the 2nd semester of 2019/2020**

Dear Students!

On the 9th of April, the Office of the Dean has provided us with further instructions and information about laboratory practices. According to the current regulations, the semester has been extended until 31st of August. Because the examination period lasts until 13th of July, we are planning to complete all lab practices after that, in the second half of July and in August (if the virus situation allows us to do so). This will require that the students are here in the labs personally for a few days in the summer. To help you prepare for this even further, more materials will soon be uploaded to e-learning. Once we receive further instructions, we will immediately inform the students, otherwise we have to wait until July for a final decision. If the Dean decides that a personal presence is not possible even after July 31, then your lab grades will be determined based on your online tests (oral or written). In the meantime, we advise all students to look at e-learning regularly, and study the uploaded materials, and prepare for the possibility of a distant examination in the summer.

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:

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, nitration, 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:
**Lecture:** Electrophilic substitution reactions of five- and six-membered heteroaromatic base compounds. Addition reactions of monocyclic aromatic hydrocarbons. Reactions of aromatic hydrocarbons containing alkyl substituents, the stability of benzyl-type reactive intermediates. Most important representatives of polycyclic aromatic hydrocarbons.

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-Hlgl bond and reactivity. Synthesis of
CHAPTER 1

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 reactions (SN1, SN2; α- and β-elimination; E1, E2 and E1cB).

14th week:

Requirements

Lecture: terminal examination.
Requirement level: Sufficient level of acquisition of the knowledge given in the lecture.
Prerequisite for applying for the exam: Obtaining a signature, for which the lectures are min. 30% must attend. This is checked electronically via the eLearning system.

Special rules of procedure during the state of emergency in the second semester of 2019/2020 school year

According to the regulations of the University of Debrecen the course is organized as distance learning from 23rd March 2020 until its withdrawal. The distance learning platform is the elearning system (elearnig.unideb.hu), where the lecture course can be found and an automatic Neptune enrollment takes place. Upon entering the learning.unideb.hu system, the student registered earlier in Neptun automatically becomes a participant of the course, where a Forum for consultations has also been created. Lecturers publish course materials or their access path in the distance learning system as well as the information connected with technical implementation of distance lessons and assessment of results. The content of the curriculum to be taught does not change, the provisions of the accepted syllabus at the beginning of this semester shall continue to apply. However the way of learning is adapted to technical possibilities. Moodle courses may be used for their own learning purposes but may not be shared or disseminated by students on the Internet.

Students receive detailed information about the exam from the course instructor through Neptune and the elearning system.

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.
### Academic Program for the 1st Year

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<tr>
<th>Week</th>
<th>Lecture</th>
<th>Seminar</th>
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<td>3rd</td>
<td>Basic notions of thermodynamics.</td>
<td>First law of thermodynamics.</td>
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<td><strong>Seminar:</strong> Basic notions of thermodynamics.</td>
<td><strong>Seminar:</strong> First law of thermodynamics.</td>
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<td><strong>Seminar:</strong> Second and third laws of thermodynamics.</td>
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<td>5th</td>
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<td><strong>Seminar:</strong> Phase transitions.</td>
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<td>6th</td>
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<td><strong>Seminar:</strong> Mixtures.</td>
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<td>7th</td>
<td>Chemical equilibrium.</td>
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<td>9th</td>
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<td><strong>Seminar:</strong> Galvanic cells.</td>
<td><strong>Seminar:</strong> Galvanic cells.</td>
</tr>
<tr>
<td>11th</td>
<td>Reaction kinetics - 1</td>
<td>Reaction kinetics - 1</td>
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<td></td>
<td><strong>Seminar:</strong> Reaction kinetics - 1</td>
<td><strong>Seminar:</strong> Reaction kinetics - 1</td>
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<tr>
<td>12th</td>
<td>Reaction kinetics - 2</td>
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<td><strong>Seminar:</strong> Reaction kinetics - 2</td>
<td><strong>Seminar:</strong> Reaction kinetics - 2</td>
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<tr>
<td>13th</td>
<td>Interfacial phenomena</td>
<td>Interfacial phenomena</td>
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<td></td>
<td><strong>Seminar:</strong> Interfacial phenomena</td>
<td><strong>Seminar:</strong> Interfacial phenomena</td>
</tr>
<tr>
<td>14th</td>
<td>Colloids.</td>
<td>Colloids.</td>
</tr>
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<td></td>
<td><strong>Seminar:</strong> Colloids.</td>
<td><strong>Seminar:</strong> Colloids.</td>
</tr>
</tbody>
</table>

### 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.

**Special rules of procedure during the state of emergency in the second semester of 2019/2020 school year**

According to the regulations of the University of Debrecen the course is organized as distance learning from 23rd March 2020 until its withdrawal. The distance learning platform is the elearning system (elearning.unideb.hu), where the lecture course can be found and an automatic Neptune enrollment takes place. Upon entering the elearning.unideb.hu system, the student registered earlier in Neptun automatically becomes a participant of the course, where a Forum for consultations has also been created. Lecturers publish course materials or their access path in the distance learning system as well as the information connected with technical implementation of distance lessons and assessment of results.

The content of the curriculum to be taught does not change, the provisions of the accepted syllabus at the beginning of this semester shall continue to apply. However the way of learning is adapted to technical possibilities. Attendance at lectures is not mandatory, participation in seminars is logged by the elearning system. Moodle courses may be used for their own learning purposes but may not be shared or disseminated by students on the Internet.
Division of Biophysics

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

1st week:
**Lecture:** Introduction to the course. Generation and absorption of X-rays. X-ray contrast materials.

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.

6th week:
**Lecture:** Medical imaging (CT, PET, SPECT, MRI)
**Seminar:** S3: Biostatistics. Continuous random variables; probability density function. Normal and standard normal distribution. Statistical design and analysis; sampling, estimation. Central limit theorem.
**Practical:** Practices are performed in subgroups of 4-5 students in a rotary system.

7th week:
**Lecture:** Research, diagnostic and therapeutic application of stable and radioactive isotopes. Contrast materials, radiopharmacons.
**Seminar:** S4: Biostatistics. Hypothesis testing. Null hypothesis. Statistical significance. One- and two tailed tests. The z-test. One sample t-test.
**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
**Seminar:** S5: Biostatistics. Paired t-test. F-test. Unpaired t-test.
**Practical:** Practices are performed in subgroups of 4-5 students in a rotary system.

9th week:
**Lecture:** Structure of biological membranes. Membrane transport.
**Seminar:** S6: Biostatistics. Conditional
probability in medicine, screening tests. ROC curve. Epidemiologic investigations: odds ratio and relative risk. The Kaplan-Meier curve.

**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 excitability.

**11th week:**
**Lecture:** Biophysics of drug delivery. Nanotechnology approaches.
**Practical:** Practical exam

**12th week:**
**Lecture:** Fluid mechanics, blood circulation. Newtonian fluids, viscosity, creams and emulsions.

**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.

*Emergency measures in response to the coronavirus epidemic in the second half of the academic year 2019/2020*

Teaching continues digitally throughout the semester. Up-to-date information and exact details on education can be found on the institute’s eLearning website.

Lecture materials in the form of multimedia audio and presentation slides will be made available electronically on the eLearning website.

Biostatistics seminars are provided in the form of electronic contact hours, where it is possible to consult with lecturers orally, with the help of the Zoom system, or in written form, within the framework of the eLearning system.

Materials of the lab exercises are also available electronically in the form of multimedia videos. We issue laboratory calculation tasks to be submitted electronically for the lab exercises. The practical assignments prepared by the students are uploaded to the eLearning page. These will be the laboratory logbooks that we will check and qualify. Before lab assignments, electronic Zoom meeting consultations are also provided. If the exercises are completed on time, the exercises will be evaluated according to the conditions of the regular procedure.

The proportion of the evaluation of the theoretical part, the biometry part, and the exercises are also done according to the conditions of the regular procedure.
CHAPTER 2
ACADEMIC PROGRAM FOR THE 2ND YEAR

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:
Lecture: Neurobiochemistry III: Biochemical background of Alzheimer disease and biochemical
CHAPTER 2

bases of its therapy.
Self Control Test

8th week:

9th week:

10th week:
Lecture: Biochemistry of the liver:
Biotransformation. Biochemical consequences of ethanol consumption.

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).

Special rules regarding the emergency situation in 2019/2020. 2nd semester

Requirements for signing the semester: Students have to carry out the practice.

Note, that taking a successful exam is very difficult without the proper understanding of the lecture material, for which attendance on all lectures is essential.

From the 7th week lectures are hold in the form of “webinars” (on-line, live lectures) through the WEBex system.

The Department provides lecture slides with additional text explanation that are uploaded into the eLearning system to help the students in studying for the exam.

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

Taking into consideration the epidemiological situation students should submit an on-line notebook through the eLearning system based on a written and video guide. Further information can be found at the eLearning website of the department. (Faculty of Medicine ? Department of Biochemistry and Molecular Biology ? 6_BMBI Pharmaceutical Biochemistry II. – practice online)

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. 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;
90-100 excellent.

Please follow the announcements of the department 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 kanapészőrfölni?

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>
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<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.

**Special regulations regarding the state of emergency in the second semester of the 2019-2020 academic year**

The material and tasks to be studied and fulfilled based on the course book will be uploaded weekly by each group’s own teacher. Students have to complete the assignments before the deadline set by their teacher. The teachers will provide an answer key after each unit. Joining the webinars is optional for the students.

A weekly test will be uploaded on the e-learning site. It is compulsory for the students to hand in six of the eight weekly tests on time.

Requirement for obtaining the signature: Six completed weekly tests. Submission of the self control tests will account for attendance. If the number of tests not submitted is more than two, the signature will be refused and the student has to repeat the course.

The time and date of the end-term test (both written and oral) will be announced after the lifting of restrictions.

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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 exlusion 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).

Special rules of procedure during the state of emergency in the second semester of 2019/2020 school year

According to the regulations of the University of Debrecen the course is organized as distance learning from 23rd March 2020 until its withdrawal. The distance learning platform is the elearning system (elearning.unideb.hu), where the lecture course can be found and an automatic Neptune enrollment takes place. Upon entering the elearning.unideb.hu system, the student registered earlier in Neptun automatically becomes a participant of the course, where a Forum for consultations has also been created. Lecturers publish course materials or their access path in the distance learning system as well as the information connected with technical implementation of distance lessons and assessments of results.

The content of the curriculum to be taught does not change, the provisions of the accepted syllabus at the beginning of this semester shall continue to apply. However the way of learning is adapted to technical possibilities. Attendance at lectures is not mandatory, participation in seminars is logged by the elearning system. Moodle courses may be used for their own learning purposes but may not be shared or disseminated by students on the Internet.

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

Requirements
Exam: 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.
19. Gravimetry (theoretical background, practical steps, examples).
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).
Special rules of procedure during the state of emergency in the second semester of 2019/2020 school year

According to the regulations of the University of Debrecen the course is organized as distance learning from 23rd March 2020 until its withdrawal. The distance learning platform is the elearning system (elearnig.unideb.hu), where the lecture course can be found and an automatic Neptune enrollment takes place. Upon entering the elearning.unideb.hu system, the student registered earlier in Neptun automatically becomes a participant of the course, where a Forum for consultations has also been created. Lecturers publish course materials or their access path in the distance learning system as well as the information connected with technical implementation of distance lessons and assessment of results.

The content of the curriculum to be taught does not change, the provisions of the accepted syllabus at the beginning of this semester shall continue to apply. However the way of learning is adapted to technical possibilities. Attendance at lectures is not mandatory, participation in seminars is logged by the elearning system. Moodle courses may be used for their own learning purposes but may not be shared or disseminated by students on the Internet.

Department of Pharmaceutical Technology

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

1st week:

2nd week:

3rd week:

4th week:

5th week:

6th week:

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

8th week:
9th week:
**Lecture:** Suspensions. Definitions, types of suspensions, physical and chemical basics of suspensions. Stability of suspensions. Formulation of suspensions, investigations.

10th week:
**Lecture:** Mixing. Quality of mixing. Duration of mixing. Instruments for mixing. Homogeneity

11th week:
**Lecture:** Physical and chemical theoretical bases of drug formulation. Monophasic systems. Mechanical properties of liquids, viscosity, bases of reology. Determination of viscosity.

12th week:
**Lecture:** Di- and polyphasic systems. Interfacial occurrence: interface, interfacial tension. Wetting angle. Dispers polyphasic systems, viscosity of dispers polyphasic systems, sedimentation and flocculation, electrostatic occurrence, coagulation.

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 than 60% and fail the written test, it is prohibited to take an oral exam and get a fail (1) mark.

**Special rules for the state of emergency in the 2nd semester of 2019/2020**

Lectures are held in the form of distance learning, according to the original timetable in the form of webinar at the platform of eLearning system. Attend on-line lectures and electronic attendance register is not obligatory for students.

Electronic exam can be assigned by the Dean of the Faculty of Pharmacy.

The lecture materials are uploaded to eLearning system, this is the base of exam.

**Subject:** PHARMACEUTICAL TECHNOLOGY PRACTICE I.(PRESCRIPTION WRITING I.)

Year, Semester: 2nd year/2nd semester

Number of teaching hours:

Practical: 56

1st week:
**Practical:**

2nd week:
**Practical:**
Technical books of pharmacy (European Pharmacopoiea, Formulae Normales, Hungarian Pharmacopoiea) 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.
Solutio Castellani sine fuchsino FoNo VII.

8th week:
**Practical:** Suspensions.

<table>
<thead>
<tr>
<th>9th week:</th>
<th><strong>Practical:</strong> Peroral drops and their dose calculation.</th>
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<tbody>
<tr>
<td></td>
<td>Gutta aethylmorphini FoNo VII 10,0g</td>
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<td></td>
<td>Suspensio anaesthetica FoNo VI 100,0g</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>10th week:</th>
<th><strong>Practical:</strong> Decoctions and infusions.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gutta expectorans composita FoNo VII.</td>
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<tr>
<td></td>
<td>Infusum ipecacuanhae pro parvulo FoNo VI</td>
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<tr>
<td></td>
<td>100,0g</td>
</tr>
</tbody>
</table>

| 11th week: | **Practical:** Test 2.                           |

<table>
<thead>
<tr>
<th>12th week:</th>
<th><strong>Practical:</strong> Emulsions.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emulsio olei ricini FoNo VII. 100,0 g</td>
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<tr>
<td></td>
<td>Glycerinum boraxatum FoNo VII. 20,0g</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>13th week:</th>
<th><strong>Practical:</strong> Preparations of special emulsions (liniment).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solutio noraminophenazoni pro parvulo FoNo VII. 100,0g</td>
</tr>
<tr>
<td></td>
<td>Linimentum scabicidum FoNo VI 100,0g</td>
</tr>
</tbody>
</table>

| 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 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 behavior. 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.

Special rules for the state of emergency in the 2nd semester of 2019/2020:

The theoretical background of the practices are held in the form of distance learning, according to the original timetable in the form of webinar at the platform of eLearning system. Attend online lectures related to the practice and the electronic attendance register is obligatory for students.

Uploading and writing on-line excercises, small tests that are given by the teacher at the platform of eLearning are obligatory. Writing the two big tests at the platform of eLearning system is also obligatory. If the student get a fail (1) mark to one of the big test, the final practice mark is also a fail (1) mark. Student once has the opportunity from both tests to write an improvement test. The improvement test is also on-line test at the platform of eLearning system. Students get a 5-point grade according to the marks of the two big tests and the marks of uploaded excercises and small tests.

Department of Physiology

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

1st week:
Lecture: Introduction, preparation for laboratory practice
Neural and hormonal control of the GI tract
Motor functions of the gastrointestinal tract

2nd week:
Lecture: Secretion of saliva and gastric juice
Exocrine functions of the pancreas and liver
Absorption of nutrients

3rd week:
Lecture:
Nutrients and vitamins
Regulation of food intake and energy balance
### ACADEMIC PROGRAM FOR THE 2ND YEAR

<table>
<thead>
<tr>
<th>4th week:</th>
<th>5th week:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture:</strong> Introduction, quantitative description of renal function</td>
<td><strong>Lecture:</strong> Urinary concentration and dilution, clinical correlates</td>
</tr>
<tr>
<td>Mechanism and regulation of glomerular filtration</td>
<td>Osmoregulation, water balance, diuretics</td>
</tr>
<tr>
<td>Tubular transport processes</td>
<td>Defense of body fluid volume, sodium balance</td>
</tr>
</tbody>
</table>

**7th week:**

- **Lecture:** Hypophysis, growth hormone
- Calcium balance, physiology of bone
- The hormones of adrenal medulla, catecholamines

**8th week:**

- **Lecture:** The thyroid gland I.
- Male, Female gonadal functions
- Pregnancy, lactation

**9th week:**

- **Lecture:** The hormones of adrenal cortex I.
- The hormones of adrenal cortex II.
- The hormones of pancreatic islets

**10th week:**

- **Lecture:** Endocrine regulation of intermedier metabolism
- Self Control Test

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### 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).

**Special rules for the current epidemiological situation in the 2nd semester of 2019/2020 academic year**

Despite the current epidemiological situation, the Faculty of Pharmacy implementing its educational program announced for the 2019/2020 academic year with no change in the requirements. However, in response to the current epidemiological situation the following minor amendments apply to the above rules:

ad 1. Signature of the semester
It is mandatory to register on WEBEX Physiology discussion in every week. The attendance will be registered and the signature of the semester may be refused in case of more than three absences from these discussions.

ad 2 Evaluation during the semester (mid-semester tests)
There will be no mid-semester tests

ad 3. Examination
The second semester is closed by the final exam, which is composed of a written test plus an oral section, covering the topics of all lectures, seminars and laboratory practices of the full academic year.

On the basis of mid-semester SCTs the following special advantage is granted: every student is exempted from the written part of the final exam.

- If one is not satisfied with the received grade, (s)he may participate in final exam during the examination period. In his case the previous grade is cancelled, even if it is better than the more recent.

Information will be provided about the schedule of the exams at a later date, as it will depends on the development of the current epidemiological situation.

**Subject:** HUMAN PHYSIOLOGY II. PRACTICAL

**Year, Semester:** 2nd year/2nd semester

**Number of teaching hours:**

**Practical:** 22

1st week:
**Practical:** Orientation lecture

2nd week:
**Practical:** INVESTIGATION OF THE CARDIOVASCULAR FUNCTIONS

3rd week:
**Practical:** DETERMINATION OF PARAMETERS CHARACTERISING THE RESPIRATORY FUNCTIONS

4th week:
**Practical:** EXAMINATION OF THE BLOOD
ACADEMIC PROGRAM FOR THE 2ND YEAR

5th week:  
**Practical:** COMPUTER AIDED ACQUISITION AND PROCESSING OF BIOLOGICAL SIGNALS

6th week:  
**Practical:** EFFECTS OF ELECTROLYTES ON THE UTERINAL SMOOTH MUSCLE FUNCTION

7th week:  
**Practical:** EFFECTS OF NEUROTRANSMITTERS AND HORMONES ON THE UTERINAL SMOOTH MUSCLE FUNCTION

8th week:  
**Practical:** COMPUTER SIMULATION OF THE FRANK-STRALING-MECHANISM

9th week:  
**Practical:** SIMULATION OF THE RENAL TRANSPORT MECHANISMS

10th week:  
**Practical:** Remedial lab

11th week:  
**Practical:** Exam

**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.

**Special rules for the current epidemiological situation in the 2nd semester of 2019/2020 academic year**  
Despite the current epidemiological situation, the Faculty of Pharmacy is implementing its educational program announced for the 2019/2020 academic year with no change in the requirements.
However, in response to the current epidemiological situation the following minor amendments apply to the above rules:

ad 1. Signature of the semester
Completion of all topic sheets in the Exercise Book is a precondition of the signature of the semester.

ad 3. Examination
Laboratory practical knowledge of the students will be tested at the end of the semester as part of the written Lab Exam (multiple choice questions). The precondition of attending the Lab Exam, is presentation of the fully completed Exercise Book. The Lab exam can be completed either on the day of the Human Physiology II end-semester exam or on any other exam day.

Information will be provided about the schedule of the exams at a later date, as it will depends on the development of the current epidemiological situation.

Division of Pharmacognosy

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

1st week:

2nd week:
Practical: Carbohydrate-containing plant drugs I.

3rd week:
Practical: Carbohydrate-containing plant drugs II.

4th week:

5th week:

6th week:
Practical: Essential oils II.: Plants containing monoterpenic-based essential oils II.

7th week:

8th week:
Practical: Drugs containing secoiridoids and sesquiterpene lactones. Bitterness value determination.

9th week:
Practical: Iridoid containing plant drugs.

10th week:
Practical: Triterpenes, triterpene saponins.

11th week:
Practical: Cardenolid glycosides.

12th week:
Practical: Basic techniques in medicinal plant biotechnology, in vitro cultures producing secondary metabolites.
### ACADEMIC PROGRAM FOR THE 2ND YEAR

**13th week:**
**Practical:** Practical exam: Recognition of plant drugs.

**14th week:**
**Practical:** Practical exam: Recognition of plant drugs.

### Requirements

*Taking into account the current situation in second semester of the 2019/20 academic year to complete the practical grade, the following tasks must be completed:*

- plant dug recognition test (on a video platform, face-to-face)
- complete the three practical tests (on e-learning platform)

**Subject:** PHARMACOGNOSY THEORY I.

Year, Semester: 2nd year/2nd semester

Number of teaching hours:
Lecture: 28

<table>
<thead>
<tr>
<th>1st week: Lecture</th>
<th>2nd week: Lecture</th>
<th>3rd week: Lecture</th>
<th>4th week: Lecture</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>5th week: Lecture</th>
<th>6th week: Lecture</th>
<th>7th week: Lecture</th>
<th>8th week: Lecture</th>
</tr>
</thead>
</table>
CHAPTER 2

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

Taking into account the current situation in second semester of the 2019/20 academic year the following tasks are required to complete the lecture grade:

- optional pre-examination test (on e-learning platform) for offered grade (before the exam period).
- examination (on video platform face-to-face) based on the uploaded lectures (during the exam period).

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 from the co-workers and the rules and regulations pertaining to them
   - he / she is expected to know the rules of procedures
   - 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 3
ACADEMIC PROGRAM FOR THE 3RD YEAR

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:
Biopsychosocial model

2nd week:

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.

Special rules for the current epidemiological situation in the 2nd semester of 2019/2020 academic
Essay requirements
Pharmaceutical Psychology

2019/2020. II. Semester
The requirement of the course is to submit an essay related to one of the topics of the Pharmaceutical Psychology course; the topic will be selected by the lecturers for each student. The essay must contain a theoretical summary based on the relevant bibliographical background, research and studies published about the given topic.

Structure and content of the essay:
Title page: containing the name of the student as well as the title (topic) of the essay;
Introduction: providing a brief summary of the theoretical background of the given topic (with special regard to the importance and relevance of the topic for a pharmacy student);
Literature review: processing and analyzing topic-related references;
Summary: summarizing the main elements, key points of the literature review and describing the student’s personal opinion regarding the topic;

Reference list: should contain all (and only) the sources referred to in the text.

Formal requirements:
Length of the essay: 8 pages. The font: 12 pt Times New Roman, with 1.5 line spacing, justified alignent.

In-text citation: you have to provide relevant source information in the case of thoughts, ideas and phrases described by others, as well as in case of research results, conclusions published in an article or book. In case of textual quotations, please use quotation marks and indicate the page number of the source as well. The essay cannot be accepted if the citations and references are missing or incomplete.

References: the essay must be based on at least 5 high quality scientific references (articles, book chapters).
References must be indicated in the text as well as in the reference list applying Harvard style: https://library.aru.ac.uk/referencing/harvard.htm, or Vancouver style: https://www.imperial.ac.uk/admin-services/library/learning-support/reference-management/vancouver-style/your-reference-list/.

Resources: resouces of the given topic can be found using:
Google scholar: https://scholar.google.com/
Science direct: https://www.sciencedirect.com/


Submission of the essay: through elearning.med.unideb.hu
On the platform of Pharmaceutical Psychology you will find a section dedicated to the essays (name of the section will be Essay), where you will be able to upload your essay until the deadline.
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.
Audio files to the course book, oral exam topics and vocabulary minimum lists are also available on the website.

Special regulations regarding the state of emergency in the second semester of the 2019-2020 academic year

The material and tasks to be studied and fulfilled based on the course book will be uploaded weekly by each group’s own teacher. Students have to complete the assignments before the deadline set by their teacher. The teachers will provide an answer key after each unit. Joining the webinars is optional for the students.

A weekly test will be uploaded on the e-learning site. It is compulsory for the students to hand in six of the eight weekly tests on time.

Requirement for obtaining the signature: Six completed weekly tests. Submission of the self control tests will account for attendance. If the number of tests not submitted is more than two, the signature will be refused and the student has to repeat the course.

The time and date of the end-term test (both written and oral) will be announced after the lifting of restrictions.

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: Components and cells of the innate response. Characteristics and function of the innate immune response.

3rd week:
Lecture: Structure of MHC, MHC polymorphism. Antigen presentation.
Seminar: Structure of MHC, MHC polymorphism. Antigen presentation.

4th week:

5th week:
Lecture: B-lymphocytes. An introduction to antibody structure and function.
Practical: B-lymphocytes. An introduction to antibody structure and function.

6th week:

7th week:
Lecture: Activation and antigen-dependent differentiation of B-lymphocytes. The development of immunological memory.

8th week:
Practical: Monoclonal antibodies. Vaccination.
Self Control Test

9th week:
Lecture: Central tolerance. Peripheral mechanisms of immune tolerance.
Practical: Central tolerance. Peripheral mechanisms of immune tolerance.

10th week:
Lecture: Tumor immunology, monoclonal antibodies in tumor therapy.
Practical: Tumor immunology, monoclonal antibodies in tumor therapy.

11th week:
Lecture: Anti-viral response Hypersensitivity reactions.
Practical: Anti-viral response Hypersensitivity reactions.

12th week:
Lecture: Mechanisms of the development of autoimmune diseases.
Practical: Mechanisms of the development of autoimmune diseases.

13th week:
Lecture: Transplantation. Immunodeficiencies.
Practical: Transplantation. Immunodeficiencies.

14th week:
Lecture: Generation of B- and T-cell diversity, development of B and T lymphocytes.
Practical: Generation of B- and T-cell diversity, development of B and T lymphocytes.
Self Control Test

Requirements

Signing of the Lecture Book:
52
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.

**Modifications of the requirements due to state of emergency caused by the SARS-Cov2 epidemic valid for the 2nd semester of academic year 2019/2020**

1. **LECTURES:** lecture materials will continue to appear on the web via the e-learning system including lecture slides in ppt format, figure legends, - if appropriate-, and a word document. Students are required to carefully review the uploaded materials before the seminar dedicated for discussion of the lecture material. Formal online lectures are not offered, instead, two online seminars per week are provided.

2. **SEMINARS/PRACTICALS:**
   For discussion of the lecture material we provide two dates per week. These discussions will be organized as live webinars, using the WebEx platform available via e-learning. One of the weekly seminars is supervised by the lecturer, the other by the assigned seminar teacher.

   Attendance on seminars is obligatory, Students MUST participate in at least ONE of the two
seminars scheduled for each week. Login is required, presence online will be registered, but activity of the students is not evaluated individually and is not prerequisite for receiving an end-term signature. Technical information about using WebEx is available online through e-learning.

Seminars are designed for open discussions, answering students’ questions about the subject. At the end of each session students’ understanding of the material will be tested by answering 5 online test questions (Poll). At the end of each session students will also receive three assignments (topics/problems/questions) to be completed at home individually. Assignments need to be completed in writing, the essays must be uploaded into e-learning within 7 days. Assignments are evaluated as “well accepted”, “accepted” or “rejected needs more work” by the lecturer of the topics. Accomplished and accepted assignments is prerequisite for participation in the end-term exam.

3. END-TERM EXAM:
3.1. Requirements for end-term signature:
Participation in online seminars is compulsory. Signature will be refused for students collecting more than two absences or fail to complete all individual assignments! As described above, participation in one of the two weekly seminars is sufficient to earn the signature.

3.2. End-term exam (colloquium)
Earning the end-term signature is prerequisite for taking the end-term exam. Due to the state of emergency caused by the SARS-Cov2 epidemics we are not able to offer a grade based on in-term written tests. Grades will be issued based on performance at end-term oral examinations. Details on available dates and times or on the location will be determined and released as soon as pertinent regulations allow organization of end-term exams.

TOPIC LIST (END-TERM ORAL EXAM 2020)

1. The structure of lymphoid tissues, primary and secondary lymphoid organs.
2. Components and cells of the innate response.
3. Characteristics and function of the innate immune response.
4. Inflammation and the acute phase response
5. Antigen recognition by T-lymphocytes, Antigen presentation
7. An introduction to antibody structure, characterisation of different isotypes.
8. The molecular basis of antigen recognition by B and T lymphocytes.
9. B-cell activation and antigen-dependent differentiation of B-lymphocytes.
10. Production and clinical application of monoclonal antibodies
11. T-cell mediated immune response. Naive and effector T cells,
12. Central and peripheral immunotolerance.
13. MHC molecules, function and polymorphism.
14. The development of immunological memory.
15. Active and passive immunization. Vaccination
18. Tumor immunology. Use of monoclonal antibodies in tumor therapy
19. Transplantation, immunosuppressive drugs.
20. Congenital immunodeficiencies
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), haemophilias, 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:
**Lecture:**
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 anticoagulant therapy.

5th week:
**Lecture:**
Clinical Biochemistry II. 13. Pathobiochemistry of the renal function I.
14. Pathobiochemistry 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. Pathobiochemistry 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
CHAPTER 3

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. 
Patobiochemistry of acute hepatic disorders. 
27. 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 arrythmias II. 
**Practical:** Laboratory evaluation of autoimmune diseases. 

13th week:  
**Lecture:** 
38. Patobiochemistry 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.

**Requirements**

Clinical Biochemistry - Participation on practicals: Attendance of practicals is obligatory. Alotted 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).

**Special rules due to the emergency situation for 2019/2020 II. semester**

The annotated lectures and practices of Clinical Biochemistry II. are uploaded on weekly bases to the e-learning website. If a student has question in connection with the material of lectures or practices, the student can send it by e-mail to the teacher on the same week, when the lectures and practice materials were uploaded. At the end of the year the signature will be given to those students who attended the practices during the first four weeks, and download the practice material of a given week and fill out the work sheet of the practical book according to the instructions provided on the slides during the distance learning period. The Department of Laboratory Medicine will record all downloads made by the students on the last working day of each week at 3 p.m. The practical book might be checked during the semester or on the exam. The signature of the semester will be refused in case of more than two undone practices. This semester is closed by written exam. The timing of the final exam will be announced later.

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.
### CHAPTER 3

<table>
<thead>
<tr>
<th>3rd week:</th>
<th>6th week:</th>
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</thead>
<tbody>
<tr>
<td><strong>Practical:</strong> Imipramine, promethazine, trimethoprim, quinine.</td>
<td><strong>Practical:</strong> Investigation of the Boron-Zinc ointment; investigation of Pulvis Chinacisalis</td>
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<tr>
<td>4th week:</td>
<td>7th week:</td>
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<tr>
<td><strong>Practical:</strong> Coffein, theobromine, theophylline, allopurinol.</td>
<td><strong>Practical:</strong> Analysis of Suppositorium analgeticum and Rutascorbin tablet.</td>
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<tr>
<td>5th week:</td>
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<tr>
<td><strong>Practical:</strong> Analysis of china alkaloids, drotaverin, papaverin. Quareline tablet.</td>
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#### Requirements

**Requirement:** Pharmaceutical Chemistry Theory I.

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 50% of the maximum score 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").

#### Special rules for the state of emergency in the 2nd semester of 2019/2020

After 11 March the remaining lab practices can be completed using e-learning system. In each lab practices, real-time tests and worsheets have to be implemented. The conditions of evaluations are similar to normal case.

The final grades are calculated as an average of the results during the normal and distance learning.
Subject: **PHARMACEUTICAL CHEMISTRY THEORY II.**
Year, Semester: 3rd year/2nd semester
Number of teaching hours: Lecture: 56

1st week:  

2nd week:  

3rd week:  

4th week:  

5th week:  

6th week:  

7th week:  

8th week:  
**Lecture:** Inorganic and organic antiseptic agents, disinfectants. Alcohols, phenols, N-chloro compounds, surface active agents, dyes. Synthetic antibacterial agents. Sulfonamides, nitrofuran derivatives.

9th week:  
**Lecture:** Fluoroquinolones. Antifungal compounds: imidazoles, triazoles, Antifungal antibiotics: polyenes, griseofulvin.

10th week:  

11th week:  
**Lecture:** Natural and semi-synthetic cephalosporins. Carbacephems. Monocyclic B-lactams.

12th week:  
**Lecture:** Aminocyclitol (aminoglycoside) antibiotics. Macrolide antibiotics, erythromycin and semisynthetic derivatives. Ansa-macrolides. Natural and semi-synthetic tetracyclins.
CHAPTER 3

13th week:

14th week:

Requirements

Requirement: Pharmaceutical Chemistry Theory I.
Lectures: Attendance to lectures is 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.
Condition to final exam is to fulfill the Pharmaceutical Chemistry Practice II. and the self-control test (at least 85% rate of success).
The final exam is oral (covering Pharmaceutical Chemistry I. and II.).

Special rules for the state of emergency in the 2nd semester of 2019/2020

The lectures are integrated to the E-learning system. Attendance to lectures is recommended but not compulsory. Explanations and self-control tests are provided to all topics to support the understanding.
Condition to final exam is to fulfill the Pharmaceutical Chemistry Practice II. and the self-control test using a real-time test at E-learning system (at least 85% rate of success).
The final exam is written or/and oral (covering Pharmaceutical Chemistry 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.)
Soluto anticoagulans “ACD” (Ph.Hg.VII.)

3rd week:
Practical: Collins “C” solution
Kardiostop I. solution

4th week:
Practical: Oculogutta neomycini (FoNo.VII.). Oculentum simplex (Ph.Hg.VII.). Oculentum hydrosum (Ph.Hg.VII.) Oculentum neomycini FoNo VII.

5th week:
Practical: Test from infusions and eye preparations.
ACADEMIC PROGRAM FOR THE 3RD YEAR

6th week:  
Practical: High-shear granulation.  

7th week:  
Practical: Fluid bed granulation.  

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:  
Practical: Semisolid dosage forms ‘3.  

12th week:  
Practical: Suspension type ointments Pastes. Formulation techniques, equipment.  

13th week:  

14th week:  

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.

Special rules for the state of emergency in the 2nd semester of 2019/2020

The theoretical background of the practices are held in the form of distance learning, according to the original timetable in the form of webinar at the platform of eLearning system. Attend online lectures related to the practice and the electronic attendance register is obligatory for students.

Uploading and writing on-line exercises, small tests that are given by the teacher at the platform of eLearning are obligatory. Writing the three tests from Tabletting, Galenic and Aseptic part at the platform of eLearning system is also obligatory. If the student get a fail (1) mark to one of the three tests, the final practice mark is also a fail (1) mark. Student once has the opportunity from both tests to write an improvement test. The improvement test is also on-line test at the platform of eLearning system.

The average of the three tests will give the final practice mark (5-point grade).
Subject: PHARMACEUTICAL TECHNOLOGY PRACTICE III. (PRESCRIPTION WRITING III.)
Year, Semester: 3rd year/2nd semester
Number of teaching hours:
Practical: 56

1st week:
Practical: Course: Prescription Pharmacy
Introduction, general information. Labour safety, laboratory regulations. Requirements.

2nd week:
Practical: Course: Prescription Pharmacy
Vaginal dosage forms (ovulum, globulus, globulus vaginalis longiformis), Preparation of 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 Lsolution (SZOTE). Kalium dihydrogenphosphoricum 2,05g. Kalium hydrophosphoricum 9,70g. Kalium chloratum 1,12g. Natrium hydrogenocarbonicum 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 hydrosym Ph.Hg.VII 20,0g, Oculentum neomycini FoNoVII 10,0g

5th week:
Practical: Course: Prescription Pharmacy

6th week:
Practical: Course: Prescription Pharmacy Test 1.

7th week:
Practical: Course: Prescription Pharmacy 19.
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. 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 behavior. 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.

Special rules for the state of emergency in the 2nd semester of 2019/2020

The theoretical background of the practices are held in the form of distance learning, according to the original timetable in the form of webinar at the platform of eLearning system. Attend online lectures related to the practice and the electronic attendance register is obligatory for students.
Uploading and writing on-line excercises, small tests that are given by the teacher at the platform of eLearning are obligatory. Writing the two big tests at the platform of eLearning system is also obligatory. If the student get a fail (1) mark to one of the big test, the final practice mark is also a fail (1) mark. Student once has the opportunity from both tests to write an improvement test. The improvement test is also on-line test at the platform of eLearning system. Students get a 5-point grade according to the marks of the two big tests and the marks of uploaded excercises and small tests.

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:

4th week:

5th week:

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:
**Lecture:** Inhalations and aerosols. Definitions.

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 then 60% and fail the written test, it is prohibited to take an oral exam and get a fail (1) mark.

**Special rules for the state of emergency in the 2nd semester of 2019/2020**

Lectures are held in the form of distance learning, according to the original timetable in the form of webinar at the platform of eLearning system. Attend on-line lectures and electronic attendance register is not obligatory for students.

Electronic exam can be assigned by the Dean of the Faculty of Pharmacy. The lecture materials are uploaded to eLearning system, this is the base of exam.

**Faculty of Pharmacy**

Subject: **PUBLIC PHARMACY PRACTICE AFTER 3RD YEAR (PREPARATION OF PHARMACEUTICAL DOSAGE FORMS, MANAGEMENT-QUALITY ASSURANCE,**
**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.**
   - 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.
   - Formulations of the compendium and FoNo.

2. **Operation and quality assurance.**
   - 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.**
   - 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.**
   - 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.
CHAPTER 4
ACADEMIC PROGRAM FOR THE 4TH YEAR

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.

Special regulations due to emergency (situation) in the second semester of 2019/2020
At least 30% of the (online) lectures must be visited. Students have to write 1 self control test, at the end of the semester. The test result must be at least 50%, if not, the students can't get the signature and are not allowed to take the final comprehensive 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 exam. Students must fill in online tests following the online practices confirming their attendance at the practices. During the semester only 1 test can be missed meaning the student did not attend the certain practice. If more than 1 test is not fulfilled by the student, it means the student missed more than 1 practices therefore his/her performance cannot be granted by a signature at the end of the semester, consequently, he/she cannot take the final comprehensive exam.

At the end of the semester, based on permission and order of the Dean of the Faculty of Pharmacy a final comprehensive electronic exam must be taken in Pharmaceutical bioanalytics and biotechnology II.

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:
CHAPTER 4

4th week:

5th week:

6th week:

7th week:

8th week:

9th week:

10th week:

11th week:
Lecture: SPRING BREAK

12th week:

13th week:
Lecture: 56. Cardiology 57. Hematology. 58.-60. Cancers of CNS (NEUROSURGERY)

14th week:

Requirements

Special rules for the state of emergency in the 2nd semester of 2019/2020

Electronic exam can be assigned by the Dean of the Faculty of Pharmacy. The lecture materials are uploaded to eLearning system, this is the base of exam.
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.  
**Seminar:** Antimalarial drugs. Development of malaria vaccine.

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.

**Rules applicable during the state of emergency in the 2nd semester of the 2019-2020 Academic Year**

On the eLearning website for the subject Medical Microbiology II, students can access a separate section for distant education. The students are required to check this site regularly for announcements, lecture and seminar material, forums and online tests (quizzes). The students are also required to check whether their e-mail addresses registered in Neptun and eLearning are appropriate and used regularly by the student. The lecture materials are uploaded as annotated lecture slides (in pdf format). Students can ask questions regarding the lecture material in a forum attached to the lectures. The questions are answered within 1-2 days by the teachers of the Department. The seminar materials are available mostly in the same format as the lecture materials. In some cases, annotated pdf files are uploaded. Students also have a chance to ask questions regarding the practices (in forums attached to the practices) which will be answered within 1-2 days. From the material of the seminars, tests (called quizzes) are uploaded that should be completed online. Students have a chance to complete these tests any time during the week (up to 5 times). These tests work according to the so called “best test” principle, which means that the system always registers the best result of the student for calculating the average performance of the period. In order to receive the signature for the subject, a weighted average performance of at least 80% is required, that is calculated from all the tests completed by the student during the distance education period. Students having a valid signature for the subject from a previous semester are not required to take the quizzes but they are encouraged to do so. If they take the quizzes they are not required to reach the 80 % average level.

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 of pharmacy.

5th week:
**Lecture:** Pharmaceutical product supply. The organization of the drug supply in selected countries. Drug manufacturing and distribution process from manufacturers to patients. Pricing aspects: manufacturing costs, wholesale margin, marketing costs and, „retail price” of the medicinal product.

6th week:
**Lecture:** Pharmacy – as an Operation of a business unit: Costs, revenue, stocks, costs of staff and liquidity rules. Taxation, social contributions. Human resources management and employment

7th week:
**Lecture:** Managing the sales and the product portfolio. The importance of the OTC versus prescriptive (Rx) products. (main characteristics of product lines, consideration of safety and economics, generic versus an innovative product).

8th week:
**Lecture:** The roles of the Health Authorities and the National Pharmacy Officer. Quality Assurance, GMP, GLP, GCP, GPP. The concepts and the most important categories of quality definitions. International organizations for pharmacists.

9th week:
**Lecture:** Drug marketing: drug information, advertisement, medical and pharmacy representatives. Life cycle of the drugs. Concept of marketing in a generics and OTC drugs. Marketing goals during the drug distribution process by contributors, wholesalers and distributors

10th week:
**Lecture:** Marketing and advertising rules, Ethical issues in the pharmaceutical distribution and care. Ethical Codex for sales. Concept of Evidence Based Medicine.

11th week:
**Lecture:** The preclinical and clinical phases of the research and development. Specific goals of a clinical trial: proof of concept, safety, efficacy. Drug development: The aspects of human rights and ethics in clinical trials: ICH-GCP guidelines, concerns about the use of placebo, healthy volunteers and patients- Vulnerable patients groups (children, pregnant, elderly).

12th week:
**Lecture:** Critical steps of the innovative drug research – drug development process and the final characteristics of medicinal products. The legal base of pharmaceutical product registration, Innovative versus generic development. Drug development: the specific aims of the preclinical and clinical phases. Laboratory and animal models, human Phase I. – Phase IV. Impact of a “Go/ No go” decision during drug development.

13th week:
**Lecture:** Drug Utilisation studies, medicinal product consumption and the use of big-data. Prevention, public healthcare and pharmaco-epidemiology. Scientific approach and statistical parameters evaluating the health status of population.

14th week:
**Seminar:** Consultation on selected topics of pharm management.
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%.

Changes for emergency phase

Lectures are held in the form of distance learning, following to the original schedule in a form of webinar/eLearning platform. Attendance on the on-line lectures or electronic attendance register is not obligatory for the students.

The lecture materials are uploaded to eLearning system, this is the official material of exam.

Registered students regularly receive lecture-specific questions by each week that will need to be answered and worked out individually; alternatively a short test will be opened that should be filled-out related to the topics of the given lecture. Once ready with the answers, it should be uploaded/ or sent back -- that will “validate” the attendance of the student and facilitate the understanding the topics of lecture for the week.

Minimum Requirements for Semester:

Students will have to participate on two obligatory interim tests during elearning period of the semester. There will be one occasion announced for retake-test for all students concerned both tests in order to complete the missed tests or to to gain improvement..

Exam:

The Dean of the Faculty could permit electronic exams.

Students should write a summary –type of assay on topics related to materials covered and then present in form of an oral presentation (on-line).

Based on the above mentioned criteria, students will be graded with a proposed mark.
# Department of Pharmaceutical Technology

**Subject:** INDUSTRIAL PHARMACEUTICAL TECHNOLOGY  
**Year, Semester:** 4th year/2nd semester  
**Number of teaching hours:**  
**Lecture:** 28  
**Practical:** 14  

<table>
<thead>
<tr>
<th>1st week:</th>
<th>9th week:</th>
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</table>
| **Lecture:** Treatment of working atmospheres  
Filtration of working atmospheres | **Lecture:** Liquid Forms I. Content of liquid forms |
| 2nd week: | 10th week: |
| **Lecture:** Iso-technology | **Lecture:** Materials of containers for liquid forms |
| 3rd week: | 11th week: |
| **Lecture:** Dissolution Lyophilization | **Lecture:** Liquid Forms II. Preparation of liquid forms |
| 4th week: | 12th week: |
| **Lecture:** Filtration of liquids Sterilization | **Lecture:** Filling of liquid forms Design of production plants |
| 5th week: | 13th week: |
| **Lecture:** Solid Forms I. Mixing process | **Lecture:** Semi-Solid Forms II. Transdermal systems |
| 6th week: | 14th week: |
| **Lecture:** Solid Forms II: Conversion into dosage form. | **Lecture:** Consultation |
| 7th week: | |
| **Lecture:** Semi-Solid Forms I. Soft gelatin capsules | |
| 8th week: | |
| **Lecture:** Packaging | |

**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.

**Special rules for the state of emergency in the 2nd semester of 2019/2020**

Lectures are held in the form of distance learning, according to the original timetable in the form of webinar at the platform of eLearning system. Attend on-line lectures and electronic attendance register is not obligatory for students.  
Electronic exam can be assigned by the Dean of the Faculty of Pharmacy. The lecture materials are uploaded to eLearning system, this is the base of exam.
CHAPTER 4

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%!

According to the emergency situation in this semester (2020-2nd semester) the tests will be carried out via the e-learning system.
The Final exam will be carried out according to the instructions of the Faculty management (Dean and vice-Dean).

Subject: **PHARMACOLOGY PRACTICE II.**
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Practical: 56

<table>
<thead>
<tr>
<th>1st week:</th>
<th>9th week:</th>
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<tbody>
<tr>
<td><strong>Practical:</strong> Introduction to Pharmacology II.</td>
<td><strong>Practical:</strong> Drugs used in acid-peptic disease. Gastro-oesophageal reflux disease (GERD). Drugs promoting gastrointestinal motility. Antiemetic drugs. Laxatives. Antidiarrheal drugs.</td>
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<th>2nd week:</th>
<th>10th week:</th>
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<th>3rd week:</th>
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<tr>
<td><strong>Practical:</strong> Experimental demonstration II.</td>
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<th>4th week:</th>
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<td><strong>Practical:</strong> Experimental demonstration III.</td>
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<th>5th week:</th>
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<tr>
<td><strong>Practical:</strong> Experimental demonstration IV.</td>
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<th>6th week:</th>
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<tr>
<td><strong>Practical:</strong> Antihypertensive agents</td>
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<th>7th week:</th>
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<tr>
<td><strong>Practical:</strong> Hypothalamic and pituitary hormones. Diabetes mellitus and antidiabetic drugs. General characteristics of steroid hormones. Adrenocorticosteroids and adrenocortical antagonists.</td>
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<th>8th week:</th>
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<td><strong>Practical:</strong> The gonadal hormones and inhibitors. Uterotonics, tocolytics. Agents that affect bone mineral homeostasis. Thyroid and antithyroid drugs.</td>
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<th>9th week:</th>
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<tr>
<td><strong>Practical:</strong> Histamine and antihistaminic drugs. Serotonin, agonists and antagonists.</td>
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<th>10th week:</th>
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<tr>
<td><strong>Practical:</strong> Antifungal agents. Antiparasitic chemotherapy: basic principles. Antiprotozoal drugs. Anthelmintic drugs.</td>
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<th>11th week:</th>
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<tr>
<td><strong>Practical:</strong> Immunopharmacology</td>
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<th>12th week:</th>
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<tr>
<td><strong>Practical:</strong> Cancer chemotherapy. General consultation on the curriculum of the second semester.</td>
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</table>
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.

Special requirements 2019/2020 2nd semester (emergency situation)

During the semester students have 2 written SCT (state exam test+ drugs), and 2 oral SCT via e-learning system. Practical grade will be calculated based on the results of the WSCT and OSCT. ((WSCT-I+WSCT-II)/2+OSCT-I+OSCT-II)/3.

90% - (excellent); 80% - (good); 70% - (satisfactory); 60% - (pass) 50-60% needs to be improved, below 50% signature is refused.

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:
Lecture: Introduction to the pharmacology of gastroenterology. Drugs used in acid-peptic

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.

**Special requirements 2019/2020 2nd semester (emergency situation)**

The special rules for Final Exam (end-semester) will be announced by the Dean of the Faculty. Before, Final Exam students have pre-exam from state exam question (above 85%). During the semester if the average of two written SCT (text part) is above 90% student get exemption.

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) nonmaleficence; (2) beneficence; (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 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 acceptibility 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.

Special requirements 2019/2020 2nd semester (emergency situation)

The sources of preparation are the same. The course readers are uploaded in the e-learning surface. The indicated book chapters page numbers are provided. The slides are uploaded. Typed versions of material discussed during the seminars are also uploaded.

- Non-compulsory materials are provided - some on a weekly basis. These contain:
  1. Non-compulsory scientific papers
  2. Articles
  3. Videos (lectures of international professors)

- The format of the exam is the same. 10 simple choice question, based on the indicated book chapters and lecture materials. The exam will be made in a written form in the examination period. If the Faculty gives us the opportunity to handle this exam via the elearning surface, I will choose this option. Otherwise the exam should be taken personally.
CHAPTER 5
ACADEMIC PROGRAM FOR THE 5TH YEAR
CHAPTER 6
REQUIRED ELECTIVE COURSES

Department of Applied Chemistry

Subject: PHARMACEUTICAL EXCIPIENTS
Year, Semester: 3rd year/2nd semester
Number of teaching hours: Lecture: 14

<table>
<thead>
<tr>
<th>Week</th>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Basic standards of SI. Prefixes. Measurements in pharmacy.</td>
</tr>
<tr>
<td>2nd</td>
<td>Basic chemical calculations.</td>
</tr>
<tr>
<td>3rd</td>
<td>Introduction to Polymer Chemistry.</td>
</tr>
<tr>
<td>4th</td>
<td>Polymeric excipients, general characterization.</td>
</tr>
<tr>
<td>5th</td>
<td>General view of a medicine. Active ingredients, excipients, contaminants.</td>
</tr>
<tr>
<td>6th</td>
<td>Consultation, problem solving</td>
</tr>
<tr>
<td>7th</td>
<td>Mid term test</td>
</tr>
<tr>
<td>8th</td>
<td>Controlled drug release.</td>
</tr>
<tr>
<td>9th</td>
<td>Fillers, solvents, emulsifiers.</td>
</tr>
<tr>
<td>10th</td>
<td>Antioxidants, preservatives.</td>
</tr>
<tr>
<td>11th</td>
<td>Aerosol propellants, colorants.</td>
</tr>
<tr>
<td>12th</td>
<td>Materials for packaging.</td>
</tr>
<tr>
<td>13th</td>
<td>Incompatibility. Consultation, problem solving.</td>
</tr>
<tr>
<td>14th</td>
<td>End-term test.</td>
</tr>
</tbody>
</table>

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.

Special rules of procedure during the state of emergency in the second semester of 2019/2020 school year

According to the regulations of the University of Debrecen the course is organized as distance learning from 23rd March 2020 until its withdrawal. The distance learning platform is the elearning system (elearnig.unideb.hu), where the lecture course can be found and an automatic Neptune enrollment takes place. Upon entering the elearning.unideb.hu system, the student
registered earlier in Neptun automatically becomes a participant of the course, where a Forum for consultations has also been created. Lecturers publish course materials or their access path in the distance learning system as well as the information connected with technical implementation of distance lessons and assessment of results.

The content of the curriculum to be taught does not change, the provisions of the accepted syllabus at the beginning of this semester shall continue to apply. However the way of learning is adapted to technical possibilities. Attendance at lectures is not mandatory, participation in seminars is logged by the elearning system. Moodle courses may be used for their own learning purposes but may not be shared or disseminated by students on the Internet.

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 unconsciousness. Symptoms of airway obstruction. Airway management. Recovery position.

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:
**Lecture:** Death as a process. Reversibility. Assessment of vital signs. First aid for burns. Shock.

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:
Desault’s bandage, hand and finger fracture fixation. Triangular bandage.
Kramer-, pneumatic air splint device.
Bone fracture care by body regions.

Complex trauma care.

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.

Special rules for Emergency Medicine (2nd semester of the 2019/2020 academic year)

In accordance with the educational schedule of the Department of Emergency Medicine, pre-recorded video materials and pdf files were uploaded to our educational website (https://elearning.med.unideb.hu/).
An online video consultation will be held once for each classes, when all questions with regard to our education and the exams will be answered.
As the education of First Aid/Resuscitation and Emergency Medicine are highly practice-oriented, these cannot be completed via the internet. Therefore, active participation of students and the use of educational tools are obligatory to fulfil our requirements. Thus, at least one BLS/complex situation practice will be essential, before students can take the exam.
Compulsory attendance at 30% of lectures, as a condition for admission to the exam, is abolished.
Compulsory participation in practices, except an additional practice, is abolished, too.
Oral examination is compulsory; therefore, it will be possible only if the epidemiological situation is resolved.

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 determining the structure of macromolecules.

4th week:
Lecture: Chemical synthesis of peptides and proteines.

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


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.

Department of Pharmaceutical Surveillance and Economics

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
REQUIRED ELECTIVE COURSES

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).

Changes for emergency phase

**Lectures and seminars** are held in the form of distance learning, according to the original timetable in the form of webinar at the platform of eLearning system. Attending on-line lectures and electronic attendance register is not obligatory for students. Attending on-line seminars and the electronic attendance register is obligatory for students. The lecture materials are uploaded to eLearning system, this is the base of exam.

**Minimum Requirements for Semester:** Uploading and writing on-line exercises, small tests (altogether syllabus) that are given by the teacher at the platform of eLearning are obligatory and the completed syllabus should be uploaded.

**Exam:**
The Dean of the Faculty could permit electronic exams.

The final exam test and calculations will be provided via eLearning system.

Based on the above mentioned criteria, students will be graded with a proposed mark.

Department of Pharmaceutical Technology
CHAPTER 6

Subject: **DIETARY SUPPLEMENTS AND GENERAL NUTRIENTS**
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 28

Subject: **PHARMACEUTICAL COMPUTER ADMINISTRATION**
Year, Semester: 4th year/2nd semester
Number of teaching hours:
Lecture: 28

1st week:
**Lecture:** Computer knowledge.

2nd week:
**Lecture:** Computer programs I.

3rd week:
**Lecture:** Computer programs II.

4th week:
**Lecture:** Computer programs in pharmacy I.

5th week:
**Lecture:** Computer programs in pharmacy II.

6th week:
**Lecture:** Computer programs in pharmacy III.

7th week:
**Lecture:** Computer programs in pharmacy IV.

8th week:
**Lecture:** Exam

9th week:
**Lecture:** Ordering program on computer (in pharmacy) I.

10th week:
**Lecture:** Ordering program on computer (in pharmacy) II.

11th week:
**Lecture:** Ordering program on computer (in pharmacy) III.

12th week:
**Lecture:** Administration on computer I.

13th week:
**Lecture:** Administration on computer II.

14th week:
**Lecture:** Consultation.

**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 is absent from the practicals more than allowed in a semester.

*Special rules for the state of emergency in the 2nd semester of 2019/2020*

The lecture materials are uploaded to eLearning system. Students will get a 5-point practice grade according to a written electronic test.

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.

- 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
REQUIRED ELECTIVE COURSES

- 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.
CHAPTER 6

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: **THESIS**
Year, Semester: 5th year/2nd semester
Number of teaching hours: Practical: **28**
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:

7th week:
Lecture: Single crystal X-ray diffraction.

Structure of polymorphs. The hydrogen bond.

8th week:
Lecture: Ab initio structure determination from powder diffraction data. Indexing, Rietveld refinement.

9th week:
Lecture: Solid state NMR basics. ssNMR in polymorph research.

10th week:
Lecture: FT-IR and Raman spectroscopy and microscopy. ATR techniques.

11th week:
Lecture: Polymorphism - quality control issues

12th week:
Lecture: Polymorphism of dyes and explosives.

13th week:
Lecture: Crystallographic databases. CSD, polymorph structures in the Database.

14th week:
Lecture: Regulatory questions of polymorphism. FDA, ICH, EMEA rules, Q6A. Case studies. Polymorphism of chocolate

Requirements
Entrance conditions: successful final exam on Pharmaceutical technology II., at least 5 students.

Special rules of procedure during the state of emergency in the second semester of 2019/2020 school year

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According to the regulations of the University of Debrecen the course is organized as distance learning from 23rd March 2020 until its withdrawal. The distance learning platform is the elearning system (elearning.unideb.hu), where the lecture course can be found and an automatic Neptune enrollment takes place. Upon entering the elearning.unideb.hu system, the student registered earlier in Neptun automatically becomes a participant of the course, where a Forum for consultations has also been created. Lecturers publish course materials or their access path in the distance learning system as well as the information connected with technical implementation of distance lessons and assessment of results.

The content of the curriculum to be taught does not change, the provisions of the accepted syllabus at the beginning of this semester shall continue to apply. However the way of learning is adapted to technical possibilities. Attendance at lectures is not mandatory, participation in seminars is logged by the elearning system. Moodle courses may be used for their own learning purposes but may not be shared or disseminated by students on the Internet.

Department of Physiology

Subject: MODERN TECHNIQUES ALLOWING THE INVESTIGATION OF PHYSIOLOGICAL PHENOMENA
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Lecture: 20

1st week:
Lecture: Application of electrophysiological techniques in the investigation of the electric activities of living cells.

2nd week:
Lecture: Methods allowing the monitoring of the intracellular Ca2+ concentration in living cells.

3rd week:

4th week:
Lecture: Preparation of neurones for functional investigation. Possible advantages and disadvantages of the applicable methods.

5th week:
Lecture: Investigation of the signal transducing proteins at the levels of proteins, RNA or DNA (immunocytochemistry, immunohistochemistry, confocal microscopy, Western blot, quantitative [real-time] PCR).

6th week:
Lecture: Cell and tissue culture (primary cultures, cell lines, organ cultures).

7th week:
Lecture: Isolation and identification of contractile proteins by biochemical methods.

8th week:
Lecture: Measurements conducted on isolated ion channels: the bilayer technique.

9th week:
Lecture: tutorial

10th week:
Lecture: Final Assessment.

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>Result</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>

Special rules for the current epidemiological situation in the 2nd semester of 2019/2020 academic year

Despite the current epidemiological situation, the Faculty of General Medicine is implementing its educational program announced for the 2019/2020 academic year with no change in the requirements.

Information will be provided about the schedule of the exams at a later date, as it will depend on the development of the current epidemiological situation.

Subject: **PROBLEM BASED LEARNING IN PHYSIOLOGY**
Year, Semester: 2nd year/2nd semester
Number of teaching hours:
Practical: **28**

1st week:
**Practical:** The practices are listed at the website of the elearning.med.unideb.hu website

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 the deadline.

2. Evaluation during the semester
No mid-semester evaluation.

3. Examination
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: 
\([\text{Ca}^{2+}i]\) 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:

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 signalling 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 web site (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

Special rules for the current epidemiological situateion in the 2nd semester of 2019/2020 academic year

Despite the current epidemiological situation, the Faculty of General Medicine is implementing its educational program announced for the 2019/2020 academic year with no change in the requirements.
Information will be provided about the schedule of the exams at a later date, as it will depend on the development of the current epidemiological situation.

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 Resonance 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, Szöllösi 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
>= 80 %: excellent
Repeated/improved
exam: during the examination period, one occasion, written test.

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:
Seminar: Requirements of ISO, GLP. Preclinical experiments in pharmacology.

8th week:
Lecture: Narcosis and anesthesia of experimental animals. Intraoperative monitoring, registration of various parameters.
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
**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.

*Special rules for the state of emergency in the 2nd semester of the 2019/2020 academic year*

The lecture materials and supplementary readings are available in the e-learning folder of the course: e-learning.med.unideb.hu - Department of Surgical Techniques and Surgical Research – „Basic knowledge of surgical biomaterials for students of Pharmacy” course. After the state of emergency had been announced the remote education as online seminars is provided. From the theoretical part of the course webinars are announced via the e-learning platform for the groups according to their official timetable. Attending the webinars is compulsory. The limit of missing classes is unchanged for the entire semester, independently of the educational form as normal or remote. The practical elements in blocks and a written test will be organized when the epidemiological situation allows.