**Requirements**

<table>
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<th>Semmelweis University, Faculty of Dentistry</th>
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<tbody>
<tr>
<td>Name(s) of the Institute(s) teaching the subject:</td>
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</table>

**Name of the subject:** Genetics and Genomics  
**Credits:** 2  
**Total number of hours:** 42  
- lectures: 28  
- practices: 14  
- seminars: -  
**Type of the course (mandatory/elective):** mandatory  
**Academic year:** 2019/2020

**Code of the course:**

**Course director (tutor):** Prof. Edit Buzás  
**Contact details:** Semmelweis University, Department of Genetics, Cell- and Immunobiology  
**Position:** Professor and Chairman

**Date of habilitation and reference number:** 2009. június 2. #273

**Aim of the subject and its place in the curriculum:**  
Introductory course in classical and molecular genetics and functional genomics, as well as basic course for the clinical module. It addresses the types, general laws of human inheritance, characteristics, organization and structure of the human genome, and the most important methods and/or their application in theoretical and clinical medicine, according to the needs of medical students, and evaluates the results (in practice). It presents the forms of genetic and epigenetic variability, their mechanisms and their consequences for human health. Through selected examples, the pathway from gene to disease is analyzed using a systems biology approach.

**Location of the course (lecture hall, practice room, etc.):** Semmelweis University, Department of Genetics, Cell- and Immunobiology, H-1089 Budapest, Nagyvárad tér 4, Hungary

**Competencies gained upon the successful completion of the subject:**

**Prerequisite(s) for admission to the subject:** Cell Science, Medical Biochemistry II.

**Minimum and maximum number of students registering for the course:** According to Study and Exam Policy

**Student selection method in case of oversubscription:** According to the Study and Exam Policy

**How to register for the course:** in Neptun system
### Detailed thematic of the course:

**Lectures (2 hours per week)**:

1. Introduction to human genetics, the human genome (E. Buzás)
2. Genetic variations (Cs. Szalai)
3. Mutation and polymorphisms (Cs. Szalai)
4. Chromosomal aberrations (M. Holub)
5. Epigenetics (S. Toth)
6. Monogenic inheritance (Autosomal inheritance) (E. Pap)
7. Role of sex in inheritance (S. Toth)
8. Genetics of biological processes (S. Toth)
9. Introduction to genomics (Cs. Szalai)
10. Methods in genomics (Cs. Szalai)
11. Genomic approach of complex inheritance (Cs. Szalai)
12. Genome and environment, Population and evolution genetics and genomics (Cs. Szalai)
13. Pharmaco- and nutrigenomics (Cs. Szalai)

*The order of the lectures and the date of the midterm may vary (depending on holidays and workday transfers). Colleagues with senior teaching status may also act as lecturers, if the lecturer on schedule is prevented.*

**Practices (1.5 hours per week)**:

1. Atypical mitosis, typical and atypical meiosis
2. Cytogenetics I.
3. Cytogenetics II.
4. Introduction to pedigree analysis
5. Molecular genetic methods and applications in human genetics I.
6. Molecular genetic methods and applications in human genetics II.
7. Pedigree analysis: Autosomal inheritance
8. Pedigree analysis: Autosomal recessive inheritance
9. Pedigree analysis: Sex-linked inheritance
10. Midterm
11. Complex inheritance
12. Gene therapy
13. Gametogenesis, prenatal genetic testing
14. From genes to bedside

*The order of the practises and the date of the midterm may vary (depending on holidays and workday transfers). Practice instructors: Colleagues with teaching status at the Institute of Genetics, Cell and Immunobiology*

### Potential overlap(s) with other subjects:

Understanding of Genetics and Genomics is based on the knowledge of molecular biology and molecular genetic techniques studied at Medical Biochemistry I-II. Elective subjects taught by our institute (Sex Genetics, Epigenetics, Genomics) elaborate on some of the subchapters of “Genetics and Genomics”, with overlaps needed for understanding, focusing on topics not covered in the main subject.

### Special training activities required:

- 

### Policy regarding the attendance and making up absences:

Completion of prerequisite subject.

Practices can only be attended to in an appropriate mental and health condition. Practical absence can be remedied during the current training week, in parallel courses, after prior consultation with the practice instructors.
**Means of assessing the students’ progress during the semester**: Written midterm from the topics of taught lectures and practices. We provide an opportunity to retake the midterm, only for students who have proven absence.

**Requirement for acknowledging the semester (signature)**: According to the Study and Exam Policy the students must visit at least 75% of the lectures and practices.

**Type of the examination**: written (lectures and practices)

**Exam requirements**: 

**Exam topics:**

1.) **Introduction to human genetics and genomics.** Basic genetic terms, e.g.: genome, genetics, genomics, homologous chromosomes, gene, locus, allele, wild type allele, genotype, phenotype, homozygote, heterozygote, hemizygote, dominant, recessive, cytogenetics; Mendel’s laws, Model organisms in genetics; DNA: structure, function, amount, organization (chromatin, chromosome). Replication, transcription, mRNA maturation (splicing, alternative splicing), types of RNA-s, features of genetic code. Translation and posttranslational modifications. Human genome: nuclear and mitochondrial. Structure of eukaryotic gene. Intergenic DNA; Specific sequences of nuclear genome. Repetitive sequences. Human Genome Project, ENCODE Project

2.) **Transmission of genetic information from cell to cell in an organism.** Main features and concept of multicellular cell cycle (phases, checkpoints). M-phase: activation and activity of MPF. Features of mitotic phases. Functional parts of chromosomes (telomere, centromere, kinetochore, sister chromatids, additional protein complex: cohesin and condensin and their role). Structure and role of centrosome, the centrosome cycle. Structure of mitotic spindle. Activity of APC. Cytokinesis. Changes of DNA amount and chromosome number during cell cycle. Types, causes and consequences of atypical mitosis. Light microscopic slide: 52


4.) **Pedigree analysis** Mendelian or monogenic inheritance, Construction of pedigree: main symbols that are used in pedigrees. Pedigree analysis (characteristics pedigree patterns of monogenic inheritances: AD, AR, XD, XR, Y-linked, mitochondrial). Disease examples for monogenic inheritances (AD, AR, XD, XR, mitochondrial): **Important terms**: gene, genome, locus, allele, multiple allelism, wild type (normal) allele, genotype: homozygote, heterozygote, complex heterozygote, hemizygote, phenotype: dominant, codominant, recessive.
5.) **Cytogenetics** Structure and types of eukaryotic chromosome. Karyotyping (chromosome preparation, principle, significance and types of banding techniques, principle and significance of multicolor-FISH, and M-banding); kariogram, idiogram; X inactivation. Study of sex chromosomes in interphase. Characteristics of human karyotype. Mutagenicity tests: micronucleus and sister chromatid exchange. Chromosome territories. Light microscopic slides: 54, 60, 64

6.) **Structural chromosome mutations** Structural chromosome aberrations. Types of structural aberrations: deletion (terminal, interstitial), duplication, translocation (reciprocal, Robertsonian), inversion (paracentric, pericentric), ring chromosome, isochromosome. Balanced and unbalanced mutations. Chromosomal translocations in leukemia. Consequence of structural aberrations.


11.) **Complex inheritance.** Features of complex inheritance. Environmental factors. Heritability of the complex diseases. Disease examples

12.) **Pharmacogenomics** Pharmacogenetics and pharmacogenomics. Pharmacokinetics, -dimamics, Drug development Adverse drug response, Genomic background of adverse effects, CYP (cytochrom P-450) gene family, Warfarin, Mercaptopurine, Genes influencing pharmacodynamics, Examples of pharmacogenetic studies, Pharmacogenetics of statins, Clopidogrel, Pharmacotherapy of asthma, MODY, Succinylcholine sensitivity, Thiopurin methyltransferase variations, Role of membrane receptors in drug effects.

13.) **Nutrigenomics** Genetic variations and food, food and gene expression.


16.) Evolution genetics: Gene environmental interactions and the human genome. Natural selection. Role of infections in formation of the genome. Genetic drift, bottleneck effect. Why are some lethal mutations frequent? Examples for effects forming the genome.

17.) Genome and environment: Penetrance of the genetic variants; Interactions between highly and low penetrant variations and the environment; smoking-genome interaction, gene-environmental interactions;

18.) Gametogenesis, prenatal genetic testing: Comparison of spermatogenesis and oogenesis; Genetic aspects of infertility; Genetic aspects of assisted reproduction techniques; CGH; aCGH prenatal genetic testing; Non-invasive prenatal testing


Type and method of grading: Based on the result of the exam.

How to register for the exam: In the Neptun system, according to current university and faculty settings, or in the case of a post-holiday exam, you can apply for the exam until the morning of the last working day before the public holiday.

Opportunities to retake the exam: According to the Study and Exam Policy

Literature, i.e. printed, electronic and online notes, textbooks, tutorials (URL for online material):
Cs. Szalai (Editor): Medical Genetics and Genomics e-book, 2018
Power Point presentations of the lectures and practices; The e-book and presentations available at the homepage: http://gsi.semmelweis.hu/index.php/en/education/

Signature of the tutor:

Signature(s) of the head(s) of the Institute(s):

Date: 2019.09.27

Credit Transfer Committee’s opinion:

Comment of the Dean’s Office:

Signature of the Dean:
1 Dékáni Hivatal tölti ki, jóváhagyást követően.
2 Az elméleti és gyakorlati oktatást órákra (hetekre) lebontva, sorszámozva külön-külön kell megadni, az előadók és a gyakorlati oktatók nevének feltüntetésével. Mellékletben nem csatolható!
3 Pl. terepgyakorlat, kórlegelemzés, felmérés készítése stb.
4 Pl. házi feladat, beszámoló, zárthelyi stb. témaköre és időpontja, pótlásuk és javításuk lehetősége.
5 Elméleti vizsga esetén kérjük a tételsor megadását, gyakorlati vizsga esetén a vizsgázatás témakörét és módját.
6 Az elméleti és gyakorlati vizsga beszámításának módja. Az évközi számonkérések eredményeink beszámítási módja.
# REQUIREMENTS

| Semmelweis University, Faculty of Dentistry  
Name(s) of the Institute(s) teaching the subject: Department of Medical Chemistry, Molecular Biology and Pathobiochemistry |
|---|

| Name of the subject: Molecular Cell Biology II  
Credits: 4  
Total number of hours: 56 lectures: 28 practices: 28 seminars: 0  
Type of the course (mandatory/elective): mandatory |
|---|

| Academic year: 2020/21, spring semester  
Code of the course: not available yet |
|---|

| Course director (tutor): Dr. Miklós Csala PhD, DSc  
Contact details: Department of Medical Chemistry, Molecular Biology and Pathobiochemistry; 00-36-1-459-1500 ext. 60115  
Position: full professor  
Date of habilitation and reference number: |
|---|

| Aim of the subject and its place in the curriculum: The subject provides the foundations of modern molecular medicine, emphasizing points of interest for diagnostics, interventional and therapeutic applications.  
It serves as a base for several fields in medicine, such as molecular pathology, molecular diagnostics, pharmacology, gene therapy and medical biotechnology. |
|---|

| Location of the course (lecture hall, practice room, etc.):  
Semmelweis University, EOK Building, H-1094 Budapest, Tűzoltó street 37–47. |
|---|

| Competencies gained upon the successful completion of the subject:  
Students having completed this course will be familiar with the principles of molecular biology, which will help them to understand and apply different fields of molecular medicine, which is fundamental in the 21st century. |
|---|

| Prerequisite(s) for admission to the subject:  
Successful exams in Molecular Cell Biology I as well as in Dental Biochemistry II. |
|---|

| Minimum and maximum number of students registering for the course: obligatory subject for 1st-year medical students; maximal number of participants: 90  
Student selection method in case of oversubscription: does not apply |
|---|

| How to register for the course:  
Electronically, over the Neptun system |
**Detailed thematics of the course**:  

*Lectures (2x45 min a week):*

1. Maintenance of cellular homeostasis: coordination of cell division, differentiation and cell death; exogenous mitogenic and survival stimuli
2. Basic concepts of the cell cycle
3. Checkpoints in the cell cycle and their molecular control mechanisms
4. Active and passive cell death, variants of programmed cell death
5. Apoptotic pathways
6. Integrity of the genome as a major determinant of cell proliferation and survival
7. Coordination of protooncogene and tumor suppressor pathways under physiological and pathological conditions
8. Subcellular metabolic compartments: the cytoplasm and the nucleus
9. Subcellular metabolic compartments: the biochemistry of mitochondria
10. Subcellular metabolic compartments: the endoplasmic reticulum and peroxisomes
11. Subcellular metabolic compartments: the biochemistry of the Golgi membrane and lysosomes
12. Molecular integration of signalling pathways at the cellular level – coordination of external and internal signals
13. Molecular integration of signalling pathways at the cellular level
14. The role of endoplasmic reticulum and mitochondria in signalling pathways

*Practicals (4x45 min every second week):*

1. Bioinformatics: Design of PCR primers; amplification of the TAS2R38 taste receptor gene by PCR
2. Genotyping a point polymorphisms in the TAS2R38 gene by PCR-RFLP
3. Transcriptional regulation of the lac operon in E. coli
4. Regulation and coordination of cell proliferation, differentiation and cell death (consultation)
5. Investigation of subcellular fractions (nucleus and cytoplasm)
6. Investigation of subcellular fractions (mitochondria and microsomes)
7. Discussion of exam topics (consultation)

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**Potential overlap(s) with other subjects:**
Dental Biochemistry (fundamental regulatory processes)  
Pathobiochemistry (genetically encoded pathological processes)

**Special training activities required:**

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**Policy regarding the attendance and making up absences:**
Participation in the laboratory practicals is compulsory; students are obliged to sign the attendance sheets at the end of each lesson. In case of more than two missed labs the semester cannot be acknowledged and the student is not going to be allowed to sit for the terminal exam. Missed practicals can be made up only in the same week with another group; certificate of participation issued by the host teacher has to be presented by the student to his/her own teacher.

**Means of assessing the students’ progress during the semester:**
No mid-term exams are held.

**Requirement for acknowledging the semester (signature):**
Participation in 75% of labs is compulsory. Attendance will be recorded weekly.
**Type of the examination:**
The final exam is an oral exam conducted by a two-member examination committee. Students take three theoretical and a practical (lab) topic from the topic list which will be published on the website well before the commencement of the semester.

**Exam requirements**:
Students will be examined from the material discussed on the lectures and practicals, as well as designated chapters from the official textbook and notes of the course.

**Type and method of grading**:
The final grade is determined by the two-member examination committee. Students have to have at least a minimal knowledge on each topic to pass the exam.

**How to register for the exam**:
Electronically, in the Neptun system.

**Opportunities to retake the exam**:
Three attempts are possible; exams can be retaken the next possible date following the exam.

**Literature, i.e. printed, electronic and online notes, textbooks, tutorials (URL for online material)**:
- Lodish: Molecular Cell Biology (8th edition)
- Hrabák: Laboratory Manual – Medical Chemistry and Biochemistry
- [http://semmelweis.hu/orvosi-vegytan/en/students/molcellbio1/](http://semmelweis.hu/orvosi-vegytan/en/students/molcellbio1/) (uploaded lecture, consultation and lab files)

**Signature of the tutor**:
Dr. Gergely Keszler

**Signature(s) of the head(s) of the Institute(s)**:
Dr. Gergely Keszler, deputy director

**Date**:
September 24, 2019

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1 Dékáni Hivatal tölti ki, jóváhagyást követően.
2 Az elméleti és gyakorlati oktatást órákra (hetekre) lebontva, sorszámozva külön-külön kell megadni, az előadók és a gyakorlati oktatók nevének feltüntetésével. Mellékletben nem csatolható!
3 Pl. terepgyakorlat, kórlapelemzés, felmérések készítése stb.
4 Pl. házi feladat, beszámoló, zárthelyi stb. témaköre és időpontja, pótlásuk és javításuk lehetősége.
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6 Az elméleti és gyakorlati vizsga beszámításának módja. Az évközi számonkérés eredményeink beszámítási módja.
Semmelweis University, Faculty of Dentistry

Name(s) of the Institute(s) teaching the subject: Department of Physiology

**Name of the subject:** Medical and Dental Physiology I.

**Credits:** 9

**Total number of hours (semester):**
- lectures: 84
- practices: 49
- seminars: -

**Type of the course (mandatory/elective):** mandatory

**Academic year:** 2019/2020 academic year, I. semester

**Code of the course:** FOKOELT187_1A

**Course director (tutor):** Dr. László Hunyady

**Contact details:** Semmelweis University, Department of Physiology; phone: +36-1-459-1500/60400

**Position:** Full Professor

**Date of habilitation and reference number:** 1997.05.26.; reference number: 197

**Aim of the subject and its place in the curriculum:**
The goal of Medical and Dental Physiology course is to give the students the understanding of the concepts and principles of medical and dental physiology. The lectures provide the information base while the seminars and practices provide the student with an opportunity to assimilate and integrate the material. Appropriate clinical perspectives are presented throughout the course.

**Location of the course (lecture hall, practice room, etc.):**
Semmelweis University; Department of Physiology; H-1094 Budapest, Tűzoltó u. 37-47.

**Competencies gained upon the successful completion of the subject:**
Understanding of the human physiology which is foundation of medical and dental practice.

**Prerequisite(s) for admission to the subject:**
Anatomy, Cell, Histology and Embryology II, Medical Biochemistry, Molecular and Cell Biology I., Medical Biophysics II.

**Minimum and maximum number of students registering for the course:**
Maximum 100 students based on the registration in the NEPTUN system.

**Student selection method in case of oversubscription:**
- How to register for the course:

Registration must be recorded through the NEPTUN system.
## Detailed thematic of the course:

### Lectures
1. Introduction, body fluids. Functions of cellular membranes, transport across membranes. Transepithelial transports.
3. Ion channels and resting membrane potential. Action potential. Physiology of nerve cells, synaptic transmission in the central nervous system.
5. Cardiac cycle. Regulation of cardiac output. Electrocardiography (ECG).

### Practices
- Typing of Blood Groups, Blood Coagulation Test
- Blood cell counting, determination of hemoglobin concentration and hematocrit, measurement of erythrocyte sedimentation rate
- Leukocyte differential count on peripheral blood smear
- Recording and analyzing the human ECG
- Blood pressure measurement in humans
- Computer simulation: Skeletal and smooth muscle
- Evaluation of acid-base parameters with the Siggaard-Andersen nomogram

### Potential overlap(s) with other subjects:
- 

### Special training activities required:
- 

### Policy regarding the attendance and making up absences:
The lecture hours per week are 6; the practice hours per week are 3.5. The attendance of a minimum of The attendance of a minimum of 75% of practices (including seminars) is necessary for the end-term signature. Students must write a lab report for each practice using the Practical Book. The Practical Book should be signed by the teacher not later than one week after the practice. Participation in the practices is compulsory. No more than three absences from practices (6 seminar hours and 4.5 practice hours) are allowed for any reason; otherwise the semester will not be credited. There are no extra practices and missed practices cannot be retaken. Absence from the exam must be certified at the Head of the Department or Course Director within 3 working days.
**Means of assessing the students’ progress during the semester**: The knowledge of the students is tested in a written form on a weekly base. The written short tests cover the material of lectures of the previous week.

**Requirement for acknowledging the semester (signature)**: The attendance of a minimum of 75% of practices (including seminars) is necessary for the end-term signature. Students must write a lab report for each practice using the Practical Book. The Practical Book should be signed by the teacher not later than one week after the practice. Participation in the practices is compulsory. No more than three absences from practices (6 seminar hours and 4.5 practice hours) are allowed for any reason; otherwise the semester will not be credited.

**Type of the examination**: In the examination period the students have to give semi-final exam in the first semester.

**Exam requirements**: Requirements of the semi-final exam: material of the Medical and Dental Physiology I. The semi-final exam is oral exam. The oral exam consists of two theoretical questions (I-II). The overall result of the oral exam is based on the two theoretical grades and the lab work grade but a failed (1) theoretical question results in an overall failed (1) final exam. Lists of the theoretical questions are listed in the webpage in the Department of Physiology. The following rules will be enforced during the exams: electronic devices must be kept in the baggage; baggage and overcoats should be placed next to the wall of the lecture halls; any form of communication is disallowed; students not complying with these rules will be disqualified immediately.

**Type and method of grading**: The semi-final exam is oral exam. The exam starts at 8:45 by showing up in the selected exam place. Your exam place and examiners are announced in written form at 8:30 (attached to the front door of the corridor of the Physiology Practice Rooms). The students need to bring ID card and the laboratory report book to participate in the exam. The oral exam consists of two theoretical questions (I-II). Grouping of questions, the topics of the semifinal exam can be found in http://semmelweis.hu/elettan/teaching/second-semester.

<table>
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<tr>
<th>Group</th>
<th>Topics of the semifinal exam</th>
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<tr>
<td>I</td>
<td>1 and 2 topics</td>
</tr>
<tr>
<td>II</td>
<td>3, 4 and 5 topics</td>
</tr>
</tbody>
</table>

The overall result of the oral exam is based on the two theoretical grades but a failed (1) theoretical question results in an overall failed (1) exam. The mathematical average of two oral exam grades gives the grade of the semi-final exam:

- **Excellent (5)**: 4.51 - 5.00
- **Good (4)**: 3.51 - 4.50
- **Satisfactory (3)**: 2.51 - 3.50
- **Pass (2)**: 2.00 - 2.50
- **Fail (1)**: below 2.00 or in case of failed (1) theoretical question.

The following rules will be enforced during the exam: electronic devices must be kept in the baggage; baggage and overcoats should be placed next to the wall of the lecture halls or the practice rooms; any form of communication is disallowed; students not complying with these rules will be disqualified immediately.

Failing to certify absence cause registering “absence” = “nem jelent meg” in the NEPTUN system.
### How to register for the exam:
Registration for the exam must be recorded through the NEPTUN system.

### Opportunities to retake the exam:
Repetition of the exam is possible at least three days after the unsuccessful trial.

### Literature, i.e. printed, electronic and online notes, textbooks, tutorials (URL for online material):

#### List of textbooks:

### Signature of the tutor:

### Signature(s) of the head(s) of the Institute(s):

### Date:

### Credit Transfer Committee’s opinion:

### Comment of the Dean’s Office:

### Signature of the Dean:

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1 Dékáni Hivatal tölti ki, jóváhagyást követően.
2 Az elméleti és gyakorlati oktatást órákra (hétterekre) lebontva, sorszámozva külön-külön kell megadni, az előadók és a gyakorlati oktatók nevének feltüntetésével. Mellekletben nem csatolható!
3 Pl. terépgyakorlat, kórlapozás, felmérés készítése stb.
4 Pl. házi feladat, beszámoló, zárthelyi stb. témaköröre és időpontja, pótlásuk és javításuk lehetősége.
5 Elméleti vizsga esetén kérjük a tételsor megadását, gyakorlati vizsga esetén a vizsgált témakör és módját.
6 Az elméleti és gyakorlati vizsga beszámításának módja. Az évközi számonkérésünkre eredményeink beszámítási módja.
## REQUIREMENTS

**Semmelweis University, Faculty of Dentistry**  
Name(s) of the Institute(s) teaching the subject: Department of Physiology

<table>
<thead>
<tr>
<th>Name of the subject</th>
<th>Medical and Dental Physiology II.</th>
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<tbody>
<tr>
<td>Credits</td>
<td>9</td>
</tr>
<tr>
<td>Total number of hours (semester)</td>
<td>133 lectures: 84 practices: 49 seminars: -</td>
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<tr>
<td>Type of the course (mandatory/elective)</td>
<td>mandatory</td>
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<table>
<thead>
<tr>
<th>Academic year</th>
<th>2019/2020 academic year, II. semester</th>
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<tbody>
<tr>
<td>Code of the course1</td>
<td>FOKOELT187_2A</td>
</tr>
</tbody>
</table>

**Course director (tutor):** Dr. László Hunyady  
**Contact details:** Semmelweis University, Department of Physiology; phone: +36-1-459-1500/60400  
**Position:** Full Professor  
**Date of habilitation and reference number:** 1997.05.26.; reference number: 197

**Aim of the subject and its place in the curriculum:**  
The goal of Medical and Dental Physiology course is to give the students the understanding of the concepts and principles of medical and dental physiology. The lectures provide the information base while the seminars and practices provide the student with an opportunity to assimilate and integrate the material. Appropriate clinical perspectives are presented throughout the course.

**Location of the course (lecture hall, practice room, etc.):**  
Semmelweis University; Department of Physiology; H-1094 Budapest, Tűzoltó u. 37-47.

**Competencies gained upon the successful completion of the subject:**  
Understanding of the human physiology which is foundation of medical and dental practice.

**Prerequisite(s) for admission to the subject:**  
Medical and Dental Physiology I.

**Minimum and maximum number of students registering for the course:** Maximum 100 students based on the registration in the NEPTUN system.  
**Student selection method in case of oversubscription:** -

**How to register for the course:**  
Registration must be recorded through the NEPTUN system.
### Detailed thematic of the course

**Lectures**
2. Humoral immunity. Cellular immunity. Regulation of immune response, blood groups
3. Endocrine regulations. The hypothalamo-adenohypophyseal system; growth hormone, somatomedins.
5. Hormonal regulation of intermediary metabolism.
7. Function of the reproductive system: male sexual function; female sexual function; endocrinology of pregnancy, parturition, and lactation.
8. Introduction to neurophysiology. Physiology of nerve & glia cells.
9. Sensory functions.
10. Physiology of hearing and equilibrium.
11. Physiology of vision.
12. Motor functions.
13. Integration of autonomic responses.
14. Electroencephalogram (EEG); sleep phenomena. Learning and memory. Regulation of behavioral mechanisms, motivation; emotion.

**Practices**
- Circulatory and respiratory reflexes in rabbit
- Human pulmonary function tests
- Smooth muscle of rabbit small intestine
- Oral glucose tolerance test (OGTT)
- Electrooculography (EOG) and investigation of the vestibular system
- Reflex function
- Computer simulation: Studies on circulatory reactions of a virtual rat
- Computer simulation: Neuromuscular junction

### Potential overlap(s) with other subjects:
- -

### Special training activities required
- -

### Policy regarding the attendance and making up absences:
The lecture hours per week are 6; the practice hours per week are 3.5. The attendance of a minimum of 75% of practices (including seminars) is necessary for the end-term signature. Students must write a lab report for each practice using the Practical Book. The Practical Book should be signed by the teacher not later than one week after the practice. Participation in the practices is compulsory. No more than three absences from practices (6 seminar hours and 4.5 practice hours) are allowed for any reason; otherwise the semester will not be credited. There are no extra practices and missed practices cannot be retaken. Absence from the exam must be certified at the Head of the Department or Course Director within 3 working days.

### Means of assessing the students’ progress during the semester:
The knowledge of the students is tested in a written form on a weekly base. The written short tests cover the material of lectures of the previous week.
**Requirement for acknowledging the semester (signature):**
The attendance of a minimum of 75% of practices (including seminars) is necessary for the end-term signature. Students must write a lab report for each practice using the Practical Book. The Practical Book should be signed by the teacher not later than one week after the practice. Participation in the practices is compulsory. No more than three absences from practices (6 seminar hours and 4.5 practice hours) are allowed for any reason; otherwise the semester will not be credited.

**Type of the examination:**
In the examination period the students have to give final exam in the second semester.

**Exam requirements:**
Final exam: material of the Medical and Dental Physiology I. and Medical and Dental Physiology II. The final exam consists of written and oral part. The written and oral part of the final exam is held on the same day. The oral part consists of two theoretical questions (I-II). Failed (1) theoretical question results in an overall failed (1) final exam. The mathematical average of three partial grades (written exam grade, and two oral exam grades) gives the grade of the final exam. Lists of the theoretical questions are listed in the webpage in the Department of Physiology. The following rules will be enforced during the exams: electronic devices must be kept in the baggage; baggage and overcoats should be placed next to the wall of the lecture halls; any form of communication is disallowed; students not complying with these rules will be disqualified immediately.
**Type and method of grading:**
The final exam consists of a practical, a written and an oral part. The practical part (lab exam) takes place in the last week of the second semester. The topics of the lab exam can be found in http://semmelweis.hu/elettan/teaching/second-semester/. Passing the lab exam is not a prerequisite to participate on the final exam, but a failed lab exam is taken into account in grading the final exam as a failed (1) partial grade.

The final exam consists of a written and an oral part. The written and oral part of the final exam starts at 8:45 by showing up in the selected exam place. Your exam place and examiners are announced in written form at 8:30 (attached to the front door of the corridor of the Physiology Practice Rooms). The students need to bring ID card and the laboratory report book to participate in the exam. The written part consists of 30 questions and takes 45 minutes. Grading of the written part:

- 0-14 correct answers = 1
- 15-18 correct answers = 2
- 19-22 correct answers = 3
- 23-26 correct answers = 4
- 27-30 correct answers = 5

The oral exam starts at 9:45 and consists of two theoretical questions (I-II). Grouping of questions, the topics of the final exam can be found in http://semmelweis.hu/elettan/teaching/second-semester.

I: 1, 2, 3, 4 and 5 topics of the final exam
II: 6, 7 and 8 topics of the final exam

The overall grade of the final exam is the mean of three or four partial grades (written exam grade, two oral exam grades), but a failed (1) theoretical question results in an overall failed (1) exam.

- Excellent (5): 4.51 - 5.00
- Good (4): 3.51 - 4.50
- Satisfactory (3): 2.51 - 3.50
- Pass (2): 2.00 - 2.50
- Fail (1): below 2.00 or in case of failed (1) theoretical question.

The following rules will be enforced during the exam: electronic devices must be kept in the baggage; baggage and overcoats should be placed next to the wall of the lecture halls or the practice rooms; any form of communication is disallowed; students not complying with these rules will be disqualified immediately.

Failing to certify absence cause registering “absence” = “nem jelent meg” in the NEPTUN system.

**How to register for the exam:**
Registration for the exam must be recorded through the NEPTUN system.

**Opportunities to retake the exam:**
Repetition of the exam is possible at least three days after the unsuccessful trial.

**Literature, i.e. printed, electronic and online notes, textbooks, tutorials (URL for online material):**

**List of textbooks:**
<table>
<thead>
<tr>
<th><strong>Signature of the tutor:</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Signature(s) of the head(s) of the Institute(s):</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Date:</strong></td>
<td>2019. 09. 26.</td>
</tr>
<tr>
<td><strong>Credit Transfer Committee’s opinion:</strong></td>
<td></td>
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<tr>
<td><strong>Comment of the Dean’s Office:</strong></td>
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<tr>
<td><strong>Signature of the Dean:</strong></td>
<td></td>
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</tbody>
</table>

1. Dékáni Hivatal tölti ki, jóváhagyást követően.
2. Az elméleti és gyakorlati oktatást órákra (hetekre) lebontva, sorszámozva külön-külön kell megadni, az előadók és a gyakorlati oktatók nevének feltüntetésével. Mellékletben nem csatolható!
3. Pl. terepgyakorlat, körülpelemzés, felmérés készítése stb.
4. Pl. házi feladat, beszámoló, zárthelyi stb. témaköre és időpontja, pótlásuk és javításuk lehetősége.
5. Elméleti vizsga esetén kérjük a tételsor megadását, gyakorlati vizsga esetén a vizsgázatás témakörét és módját.
## REQUIREMENTS

<table>
<thead>
<tr>
<th>Semmelweis University, Faculty of Dentistry</th>
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</thead>
<tbody>
<tr>
<td>Name(s) of the Institute(s) teaching the subject: Department of Medical Biochemistry</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of the subject: Dental Biochemistry II.</th>
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</thead>
<tbody>
<tr>
<td>Credits: 3</td>
</tr>
<tr>
<td>Total number of hours: 42 lectures: 28 practices: 14 seminars:</td>
</tr>
<tr>
<td>Type of the course (mandatory/elective): mandatory</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic year: 2020/2021</th>
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</thead>
<tbody>
<tr>
<td>Code of the course¹: FOKOBI232_2A</td>
</tr>
<tr>
<td>Course director (tutor): Prof Krasimir Kolev</td>
</tr>
<tr>
<td>Contact details: H-1094 Budapest, Tűzoltó u. 37-47. tel: +36-1-459-1500#60010 email: <a href="mailto:Kolev.Krasimir@med.semmelweis-univ.hu">Kolev.Krasimir@med.semmelweis-univ.hu</a></td>
</tr>
<tr>
<td>Position: professor</td>
</tr>
<tr>
<td>Date of habilitation and reference number: 2008, Ref. 261</td>
</tr>
</tbody>
</table>

| Aim of the subject and its place in the curriculum: The aim of the course is to comprehensively describe metabolic processes in the human body, from a medical point of view. The main theme of the semester is to elaborate further on carbohydrate and lipid metabolism commenced in Medical Biochemistry I, elaborate on amino acid and nucleotide metabolism, examine more thoroughly intermediary metabolism including the integration of processes throughout the organs and the human body as a whole. Furthermore, this course aims to afford to medical students the skills of being able to interpret complex physiological processes in the human body at a molecular level. During practices they discuss rapidly developing, promising areas of medicine (“tomorrow's medicine”). The medical biochemical orientation of the course is based on the presentation of molecular bases of diseases that pose serious public health problems (cardiovascular, neurodegenerative, cancer states), with particular emphasis on discussing potential molecular targets of therapy. |

| Location of the course (lecture hall, practice room, etc.): Premises located in the Basic Medical Sciences building (laboratory rooms located on the first floor and lecture halls located on the ground floor). |

| Competencies gained upon the successful completion of the subject: Upon the successful completion of the curriculum, the student should be able to: Identify biochemical structures, know and understand the reactions in which medically important molecules participate; know and understand inter-organ biochemical processes; know and understand integrated metabolic functions of the human body. Overall, such knowledge is essential for understanding physiological and pathological processes and, consequently, for making sound professional decisions. |

| Prerequisite(s) for admission to the subject: Dental Biochemistry I., Medical Chemistry |

<p>| Minimum and maximum number of students registering for the course: Not applicable for mandatory subjects |
| Student selection method in case of oversubscription: Not applicable for mandatory subjects |
| How to register for the course: Application is through the Neptun online system |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Lectures: weekly 1x90 min (2 hours)</th>
<th>Practices (P): 2 hours every other week</th>
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</thead>
<tbody>
<tr>
<td>Prof. Ádám Veronika (ÁV)</td>
<td></td>
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<tr>
<td>Prof. Csanády László (CSL)</td>
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<tr>
<td>Prof. Kolev Kraszimir (KK)</td>
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<tr>
<td>Dr. Komorowicz Erzsébet (KE)</td>
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<tr>
<td>Dr. Szöllősi András (SZA)</td>
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<tr>
<td>Dr. Töröcsik Beáta (TB)</td>
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<tr>
<td>Prof. Tretter László (TL)</td>
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</tbody>
</table>

   P: Determination of transaminases and creatine kinase activity

   P: Determination of transaminases and creatine kinase activity

   P: Vitamin B12 deficiency and methylmalonic acidemias

4. Structure and function of nucleotides. The fate of nucleotides obtained through diet. Formation and elimination of uric acid; its metabolic role in humans. Synthesis and degradation of purine and pyrimidine nucleotides. Effects of cytostatic drugs on nucleotide metabolism. (KK, TL)  
   P: Vitamin B12 deficiency and methylmalonic acidemias

   P: Acute and chronic liver disease

   P: Acute and chronic liver disease

<table>
<thead>
<tr>
<th>8</th>
<th>Triggers of blood clotting, amplification of the initiation.</th>
<th>P: Tumor metabolism</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Fibrinolysis. Activation of plasminogen. Inhibitors of plasmin. (KK, KE)</td>
<td>P: Gut-brain interaction through metabolites of the intestinal flora</td>
</tr>
<tr>
<td>10</td>
<td>Inhibitors of blood coagulation and negative feedback mechanisms. (KK, KE)</td>
<td>P: Gut-brain interaction through metabolites of the intestinal flora</td>
</tr>
</tbody>
</table>

**Potential overlap(s) with other subjects:** None

**Special training activities required:** None

**Policy regarding the attendance and making up absences:** Practices are mandatory. It is not possible to make up for missed practices. In case of absences amounting to more than 2 practices, the semester is not acknowledged. Arriving to a practice with a delay of more than 10 minutes is considered an absence.
Means of assessing the students’ progress during the semester: not applicable

<table>
<thead>
<tr>
<th>Requirement for acknowledging the semester (signature):</th>
<th>Attendance of at least 75 % of the practical classes.</th>
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</thead>
<tbody>
<tr>
<td><strong>Type of the examination:</strong> Final. Form: written test exam, based on material of the official textbook, lectures and practices published at the department's Moodle e-learning system (<a href="https://itc.semmelweis.hu/moodle/">https://itc.semmelweis.hu/moodle/</a>).</td>
<td></td>
</tr>
<tr>
<td><strong>Exam requirements:</strong> The material for the written test exam is the material of the lectures and practices in the subject, with the corresponding textbook chapters.</td>
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<td><strong>Type and method of grading:</strong> A competition is held on week 13, and the structure of the competition is the same as that of the semi-final. The grade of the semi-final exam is based on:</td>
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<tr>
<td><strong>Written test:</strong> This test consists of multiple choice questions (MCQs) from which max 65 points can be obtained. Grade calculation of the semi-final exam: 60-65: grade 5 (excellent) 49-59: grade 4 (good) 41-48: grade 3 (satisfactory) 33-40: grade 2 (pass) If 32 and below, then the grade of the semi-final exam is 'fail'.</td>
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</tr>
<tr>
<td><strong>How to register for the exam:</strong> The exam dates are announced on the 12th week of the semester. We provide at least one exam date each week. Applications are made in the Neptun system in accordance with the University Bylaws for Study and Exam Rules.</td>
<td></td>
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<td><strong>Opportunities to retake the exam:</strong> A retake is possible on the closest announced exam date at least one day after an unsuccessful exam.</td>
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<td><strong>Literature, i.e. printed, electronic and online notes, textbooks, tutorials (URL for online material):</strong> Harper’s Biochemistry (30th edition, or latest) Online material published at the department's Moodle e-learning system (<a href="https://itc.semmelweis.hu/moodle/">https://itc.semmelweis.hu/moodle/</a>).</td>
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6 Az elméleti és gyakorlati vizsga beszámításának módja. Az évközi számonkérések eredményeink beszámítási módja.