

## REQUIREMENTS

<b>Semmelweis University, Faculty of General Medicine – single, long-cycle medical training programme</b> <b>Name of the host institution (and any contributing institutions):</b>			
<b>Name of the subject:</b> <b>in English:</b> Laboratory Medicine <b>in German:</b> Labormedizin <b>Credit value:</b> 3 <b>Semester:</b> 7-8 <i>(as defined in the curriculum)</i>			
<b>Total number of classes per week:</b> 35	<b>lectures:</b> 21	<b>practical lessons:</b> 14	<b>seminars:</b>
<b>Type of subject:</b> <u>compulsory</u> optional            elective (PLEASE UNDERLINE AS APPLICABLE)			
<b>Academic year:</b> 2023/2024			
<b>Language of instruction, for optional or elective subjects:</b> english			
<b>Course code:</b> AOKLMI709_1A <i>(In the case of a new subject, this cell is filled in by the Dean's Office, following approval)</i>			
<b>Course coordinator:</b> Prof. Dr. Barna Vásárhelyi <b>Place of work, phone number:</b> Laboratóriumi Medicina Intézet, 06-1-361-459/62098 <b>Position:</b> Head of the Institute <b>Date and number of habilitation:</b> 22/03/2010. 29/2010			
<b>Objectives of the course and its place in the medical curriculum:</b> The Laboratory Medicine curriculum is based on knowledge acquired during studies of Pathophysiology obtained during the third year. The major goal is to present some approach and diagnostic algorithms that are required for efficient test ordering and evaluation of lab test results. As part of education the students obtain information regarding: <ul style="list-style-type: none"> <li>• the procedure that generates laboratory test results (from test ordering to laboratory reports)</li> <li>• laboratory tests needed to establish a diagnosis</li> <li>• the major aspects that the medical doctors should take into account when they evaluate a laboratory report</li> <li>• novel techniques used in general laboratory (with their drawbacks and benefits).</li> </ul> Beyond the basic knowledge integrated into the internal medicine training, real diagnostic problems through life examples are discussed during the practices.			
<b>Place of instruction (address of lecture hall or seminar room etc.):</b> Semmelweis University NET Building (L06, L07, L08), Online (Zoom) and/or Semmelweis University Central Clinical Laboratory			

<p><b>Competencies acquired through the completion of the course:</b> Our goal is to provide students with the ability to set up cost-effective diagnostic algorithms and evaluate their results with the theoretical and practical knowledge of advanced diagnostic tools.</p>
<p><b>Prerequisites for course registration and completion:</b> Clinical microbiology II. (AOKMIK022_2A), Pathophysiology II. (AOKKOR510_2A)</p>
<p><b>Conditions for concurrent course registration and permission thereof in the case of a multi-semester subject:</b> It is possible by prior arrangement if the students meet the admission criterias</p>
<p><b>Student headcount conditions for starting the course (minimum, maximum) and method of student selection:</b> 1/5 – 1/4 of the Neptun registered students</p>
<p><b>Detailed course description:</b> <i>(Theoretical and practical instruction must be broken down into lessons (weeks), numbered separately. Please provide the names of lecturers in both types of lessons, indicating guest lecturers. This information is not to be attached separately. CVs of guest lecturers, however, must be attached.)</i></p> <p><b>Detailed by study block</b></p> <p><b>Monday</b>  <u>8.00-10.30 Exercise:</u> Multiplex diagnosis of a patient with metabolic disease.  <u>11.00-12.30 Exercise:</u> Laboratory diagnostics of patients with endocrine disorders.  <u>12.30-13.30 Lunch break</u>  <u>13.30-15.00 Exercise:</u> Patient, not patient - screening tests., Hypertensive patient., Obez patient.  <u>15.30-16.30 Exercise:</u> Diagnostic possibilities of an autoimmune patient.  Instructors: (Dr. Tünde Kriston, Dr. Miklós Molnár)</p> <p><b>Tuesday:</b>  <u>08.00-10.30 Exercise:</u> Diagnosis of a patient with fever. Diagnostic algorhytm of a patient with joint complaints  <u>11.00-12.30 Exercise:</u> Fluid, ionic balance disorders. Acid-base imbalance.  <u>12.30-13.30 Lunch break</u>  <u>13.30-15.00 Exercise:</u> Diagnostic algorhytm of an alcoholic patient. Kidney disorders.  <u>12.30-14.00 Exercise:</u> Anaemic patient. Haemophilic patient.  (Dr. Tünde Kriston, Dr. Miklós Molnár)</p> <p><b>Wednesday:</b>  <u>10.00-13.30 Exercise:</u> „How the clinical laboratory works” - Central Laboratory (Korányi Building)  Lectures in "blended learning" system via online (<a href="https://itc.semmelweis.hu/moodle">https://itc.semmelweis.hu/moodle</a>) with personal consultation possibilities.  <b>Lecture topics:</b>  1. Introduction, preanalytics (Dr. Barna Vásárhelyi)  2. Postanalytics (Dr. Barna Vásárhelyi)  3. Pre-analytics (Dr. Barna Vásárhelyi)  4. Bedside testing (POCT) and urinalysis (Dr. Barna Vásárhelyi)  5. Laboratory examination of inflammation (Dr. Barna Vásárhelyi)  6. Laboratory examination of the central nervous system (CSF) (Dr. Barna Vásárhelyi)  7. Metabolic diseases 1: Laboratory aspects of diabetes (Dr. Barna Vásárhelyi)  8 Metabolic diseases 2: Laboratory investigation of lipid and purine metabolism (Dr. Barna Vásárhelyi)  9. Blood count elements - blood grouping (Dr. Adrienne Fehér)  10. Haemostasis testing - Anticoagulant monitoring (Dr. Adrienne Fehér)  11. Drug level monitoring in clinical laboratory practice (Dr. Karvaly Gellért Balázs)  12. Immunological tests I. Hypersensitivity reactions, allergy tests (Dr. Zsófia Szabó)  13. Immunological tests II. autoimmune diseases and immunodeficiency tests (Dr. Zsófia Szabó)  14. Diagnostics of SARS-COV-2 at Semmelweis University (Dr. Barna Vásárhelyi)</p>

**Thursday:**  
**Break**

**Friday**

10.00-13.30 Exercise: „How the clinical laboratory works” - Central Laboratory (Korányi Building)

11.30-12.30 Lunch break

12.30-14.00 Exercise: Practical exam

14.30-16.00 Exercise: Practical exam

Examiners: (Dr. Tünde Kriston, Dr. Miklós Molnár)

**Related subjects due to interdisciplinary fields (both compulsory and elective) and potential overlaps between subjects:**

Pathology, Pathophysiology, Internal medicine

**Attendance requirements; conditions under which students can make up for absences and the method of absence justification:**

In accordance with study and examination rules, participation is compulsory in 75% of the classes. There will be make up classes twice during the week of block within the framework of the University Zoom.

**Form of assessment in the study period:**

(including the number, topics and scheduling of oral and written tests, their share in the overall evaluation, make-up tests and improvement tests)

We compile blended-learning materials for all theoretical and practical topics, which students can study in their spare time and answer the related test questions within the Moodle system. The system keeps track of their results and if they perform above 82%, we offer them the exam mark [82-89.9% - 4 (good), 92-100% - 5 (excellent)]. Students participating in the course must complete online theoretical preparation using the aforementioned e-learning materials, the completion of which is confirmed by the successful completion of the tests in the curriculum.

**Number and type of assignments for individual work and the deadline for submission:**

3 case studies per student for the first session of the block.

**Requirements to obtain the teacher's signature:**

Completing online tests and attendance at practices.

**Type of assessment** (*comprehensive examination, end-term examination, term-grade, term-grade on a three-grade rating scale, no examination*):

There will be a test exam, online MCQ test, and oral exam from the practical subjects.

**Examination requirements:**

(*list of examination topics, subject areas of tests / examinations, lists of mandatory parameters, figures, concepts and calculations, practical skills*)

**Requirements of the examination:**

(*In case of a theoretical examination, please provide the topic list; in case of a practical exam, specify the topics and the method of the exam*)

**Theoretical part: (MCQ test)**

**Theoretical topic list:**

1. Significance of laboratory tests. Importance of the preanalytical preparation. Analytical phase in the laboratory, major measurement techniques, their advantages and limitations. Post-analytical phase: criteria for validating results.
2. Quick testing options; POCT in General Practice.
3. Metabolic disorders and their diagnosis
4. Laboratory examination of gastrointestinal and liver disorders
5. Investigation of the abnormal functioning of the endocrine system
6. Possibilities of testing for autoimmune diseases
7. Therapeutic drug monitoring, tumor markers
8. Possibilities of testing kidney function.
9. Laboratory characterization of electrolyte balance and hydration status
10. Significance of blood gas analysis

11. Hematological testing options (flow cytometry)
12. Evaluation of hemostasis
13. Examination of normal and abnormal laboratory parameters and infections of special patient groups
14. The role of clinical microbiology in infection control, antimicrobial stewardship.

**Practical exam:** (oral, discussion of selected case studies, discussed during the practices)

**Topics for the practices:**

1. Hypertensive patient: Laboratory examination of cardiovascular risk factors. Laboratory evaluation of cardiac markers and circulatory insufficiency / myocardial infarction, endocarditis
2. Obese patient: Laboratory tests of lipid metabolism and carbohydrate metabolism.
3. Diarrhea patient: Diagnosis of gastrointestinal disorders
4. Alcoholic patient: Laboratory examination of liver dysfunction and infections
5. Diabetic patient: Possibilities of studying carbohydrate metabolism. Possibilities of diagnosis and follow-up of therapy.
6. Endocrine patient: Examination of the abnormal functioning of the endocrine system: hypothalamus, pituitary, gonads, thyroid, adrenal gland and cortex. Investigation of calcium phosphate metabolism disorders and diseases of the skeletal system; Connective tissue diseases and their diagnosis
7. Patient with joints complaint: Laboratory examination of the immune system (tumor markers, autoimmune diseases, infectious serological tests)
8. Kidney disease: Diagnosis of acute and chronic kidney diseases, urogenital infections
9. Critically sick patient 1.: Fluid, ion homeostasis disorders, shock
10. Critically sick patient 2.: Disorders of acid-base balance, respiratory failure
11. "Sick or not?" screening tests
12. Patient with anemia: Diseases affecting red blood cell, white blood cell and platelet formation
13. Patients with hemostatic abnormality: Tests of hemostasis.
14. Febrile patient: Laboratory diagnosis of sepsis and diseases affecting the central nervous system.

**Method and type of grading:**

*(Share of theoretical and practical examinations in the overall evaluation. Inclusion of the results of the end-of-term assessment. Possibilities of and conditions for offered grades.)*

By averaging the result of the theoretical written test and the result of the practical oral exam. The teacher during the oral examination finalizes the grade. Based on the completion of the e-learning material of the theoretical and practical materials students can receive offered exam mark [82-91.4% good (4) and 92-100% excellent (5)].

**Grading of MCQ results:**

Based on the results of 50 randomly selected questions from the theoretical topics:

- 46 - 50 points: 5 (excellent)
- 41 - 45 points: 4 (good)
- 36 - 40 points: 3 (average)
- 31 to 35 points: 2 (fair)
- 30 points or less: 1 (fail)

**List of course books, textbooks, study aids and literature facilitating the acquisition of knowledge to complete the course and included in the assessment, precisely indicating which requirement each item is related to (e.g., topic by topic) as well as a list of important technical and other applicable study aids:**

1. McPherson RA, Pincus MR: Henry's Clinical Diagnosis and Management by Laboratory Methods 22nd Edition
2. Learning guide on the website (<https://semmelweis.hu/laboratorium/english/>), and in the Moodle-system under Laboratory Medicine course (itc.semmelweis.hu)

<b>Signature of habilitated instructor (course coordinator) announcing the course:</b> Prof. Dr. Barna Vásárhelyi, OH.
<b>Signature of the director of the host institution:</b>
<b>Date of submission:</b> 05.12.2023.