

<b>Study program:</b> Integrated Academic Studies in Medicine
<b>Course title:</b> Laboratory Medicine
<b>Teacher:</b> Mirjana J. Đerić, Gorana P. Mitić, Velibor S. Čabarkapa, Biljana A. Vučković, Radmila R. Žeravica, Branislava P. Ilinčić, Romana R. Mijović
<b>Course status:</b> elective
<b>ECTS Credits:</b> 3
<b>Condition:</b> Medical Biochemistry; Pathophysiology (exam)
<p><b>Course aim</b></p> <p>Acquiring of the general principles of correct interpretation of laboratory results within the different diagnostic algorithms, and in accordance with its specificity, sensitivity and predictive clinical value. Rationalization in the choice of laboratory diagnostic algorithms and algorithms of treatment progress and outcome monitoring.</p>
<p><b>Expected outcome of the course</b></p> <p><b>Knowledge:</b> Training for the analysis and evaluation of the diagnostic cases within a multi-disciplinary context in the field of laboratory biomedicine, and then the assessment of the clinical significance of the biochemical and molecular biological indicators, the discovery of the source of errors in the testing process, knowledge of the variability of the results of laboratory tests, as well as for their interpretation from the clinical point of view.</p> <p><b>Skills:</b> Introduction to general principles of various laboratory techniques and the preparation of patients for laboratory testing. Acquiring of the skills of teamwork with physicians and experts of various specialties. Acquiring skills of critical evaluation and selection of appropriate laboratory procedures for the diagnosis, monitoring disease progression and therapy outcome.</p>
<p><b>Course description</b></p> <p><i>Theoretical education</i></p> <ul style="list-style-type: none"> <li>– Introduction to laboratory medicine.</li> <li>– Preparing a patient for sampling biological material.</li> <li>– Preanalytical variables that affect laboratory test results. Collection, analysis and identification of biological samples. The selection of proper anticoagulants. Techniques of serum and plasma separations. Proper transport and sample storage. Sources of errors and quality control. Impact of drugs on laboratory tests.</li> <li>– Analytical phase of laboratory testing. Sources of errors and quality control. Factors of analytical interference. Methodological evaluation of analytical methods. Analytical specificity, sensitivity, accuracy and precision.</li> <li>– Postanalytic phase of laboratory testing. Sources of errors. Validation of laboratory results. Biological variability and reference values. Impact of drugs on laboratory results. Interpretative comments.</li> <li>– Presentation and interpretation of laboratory results (unit selection and content). Identification of diagnostic questions: the role of laboratory testing in improving patient health outcomes. The indications for laboratory testing. Laboratory medicine specialist as part of the diagnostic team.</li> <li>– Clinical quality control of laboratory tests. Interpretation of the results of laboratory tests in accordance with the diagnosis and acquired therapy. Identifying specific clusters of laboratory results, characteristic for a particular disease. Long-term assessment of the course of the disease and treatment outcome. Critical values.</li> <li>– Laboratory testing efficiency strategy. Diagnostic sensitivity and test specificity. Predictive value.</li> <li>– Various laboratory techniques. Photometry testing. Protein analysis techniques. Electrochemical methods: ion-selective electrodes (ISE). An enzymatic assays.</li> <li>– Immunoassays. Radioimmunoassays.</li> <li>– Molecular testing. Techniques for nucleic acid analysis: amplification, mutation testing and gene expression; principles and methods of DNA and RNA isolation; PCR. Molecular genetics methods. Basic principles of flow cytometry.</li> <li>– Hematologic-cytological methods. General morphology of blood cells in peripheral blood, cell counting. Automation in Hematology. Specialized laboratory tests in hematology with the basics of immunohematology.</li> <li>– Laboratory testing of hemostasis and thrombosis. Screening tests of hemostasis. Specialized laboratory tests in hemostasis.</li> <li>– Point-of-care testing (POCT). Introducing patients to the ways of laboratory self-control.</li> <li>– Prenatal laboratory testing.</li> </ul> <p><i>Practical classes</i></p> <ul style="list-style-type: none"> <li>– Laboratory evaluation of blood plasma proteins, body fluids and tumor markers. Interpretation of the laboratory results and</li> </ul>

case-based diagnostic problem solving.

- Laboratory evaluation of carbohydrate metabolism. Dynamic function tests. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of lipid metabolism. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of biomarkers of inflammation and sepsis. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of body fluids, electrolytes and acid-base balance. Blood gas analysis. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of kidney function and urinalysis. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of humoral and cell immunity. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of endocrine system. Dynamic function tests in endocrinology. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation in hematology. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of digestive system, liver and biliary duct. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of cardiovascular system. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Laboratory evaluation of nervous system and cerebrospinal fluid (CSF). Interpretation of the laboratory results and case-based diagnostic problem solving.
- Prenatal laboratory evaluation. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Definition of sensitivity and specificity of laboratory tests. The identification of appropriate value for the diagnostic threshold. Definition of predictive value of a positive and negative test. Interpretation of the laboratory results and case-based diagnostic problem solving.
- Evaluation of errors in clinical laboratory. Diagnostic sensitivity and test specificity. Predictive value. Solving set tasks.

**Literature**

*Compulsory*

1. Đerić M, ed. Practical Handbook of Pathophysiology [CD-ROM]. Novi Sad: Faculty of medicine; 2019.
2. Laposata M. Laposata`s Laboratory Medicine. Diagnosis of Disease in the Clinical Laboratory. Third Edition. New York: McGraw-Hill Education; 2019.
3. Bruyere HJ, ed. 100 Case Studies in Pathophysiology. Philadelphia: Wolters Kluwer/Lippincot Williams&Wilkins; 2009.

*Additional*

1. Rifai N, Horvath AR, Wittwer CT, eds. Tietz textbook of clinical chemistry and molecular diagnostics. Sixth edition. St Louis, Missouri: Elsevier; 2018.

<b>Number of active classes</b>	<b>Theoretical classes: 15</b>	<b>Practical classes: 30</b>
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**Teaching methods:** Interactive lectures and practices; Consultations; Essays

**Student activity assessment (maximally 100 points)**

<b>Pre-exam activities</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
Lectures	10	Written	
Practices	20	Oral	60
Colloquium		.....	
Essay	10		