

MED 5002- Laboratory Medicine

Course Name	Code	Semester	Course type	Lecture	Work in Group (hours)	ECTS
Laboratory Medicine	MED 5002	X	Mandatory	15	26	3
Faculty, the educational program and education level	Medical Faculty One cycle higher educational program „Medicine”					
Course Implementer (s)	Leila Akhvlediani, Professor, Doctor of Biology Mob: 593537072; Tel: +995422212535 Fax: +995422212537 Email: Leila.akhvlediani@bauinternational-uni.ge					
Educational course format	Lecture, Laboratory work, group work, curation					
Scope of the learning course	Total 90 hours contact 45 hours, Including: <ol style="list-style-type: none"> 1. lecture - 15 h 2. laboratory work - 12 h 3. group work - 14 h 4. midterm exam - 2 h 5. final exam - 2 h independent work - 45 h					
Prerequisites	MED 3007					
The purpose (s) of tutorial course/modules	This course aims to introduce students to importance of the laboratory diagnostics, the principle of various methods application in laboratory medicine for the diagnostics as well as to help students to use theoretical knowledge in the interpretation of laboratory tests. The student shall acquire laboratory research methods, both traditional and modern ones as well as shall manage the latest technology and laboratory equipment, and Express diagnostic opportunities. Shall interpret correctly tests results based on the gained knowledge. This course will also help him/her estimate test preciseness.					
Teaching methods	Verbal and explanation method as well as demonstration method – visual presentation of information - will be enjoyed during the Lecture ; In order to develop argumentative skills in group work discussing during situational tasks, students will defend their opinion, justify and analyze critically the situational task worked out by the mate based on the results of laboratory studies. Moreover, they will analyze clinical cases proving the necessity of laboratory diagnostic method for differential diagnosis of various diseases as well as interpret the the analysis. They will					

	<p>synthesize theoretical knowledge with practical skills via merging and connection of the individual components.</p> <p>Project Preparation and Presentation – a student shall choose a topic provided by or independently, find the needed material, work with books, develop the project plan and the expected outcome. The project is 10-page printed material and to be presented in PowerPoint format before the audience.</p> <p>To develop practical skills laboratory sessions During laboratory sessions student shall conduct tests independently under the supervision of a teacher and analyze the results.</p>
<p>student knowledge Assessment criteria</p>	<p>Student's knowledge is assessed based on the 100-point system, of which 60 points are addressed to the mid-term evaluations, and 40 p are allocated for the final exam.</p> <p>Midterm assessment components (total 60 p)</p> <ul style="list-style-type: none"> • Attendance at the lecture - 0,67 (0,67X15 = 10) points • In Group activity - 10 points; • Activity during Laboratory work -10 points • Project Preparation and presentation- 10 points; • Midterm test -20 points <p style="text-align: center;">The group work activity assessment criteria (10 p):</p> <p>10 points - Student has been able to present complete and thorough knowledge of the subject, a substantial amount of detailed and relevant information. Demonstrate considerable depth of understanding of the studied main and additional literature. Bring forward a balanced view of the main arguments on the issues.</p> <p>9 points - Student has been able to bring forward a consistent number of deductions on most of the topics tackled. However, he is less convincing to express his thoughts regarding the raised question. A thorough knowledge of the literature and the ability to use visible. Demonstrates knowledge of the terminology, main literature and application skills.</p> <p>8 points - Student has been able to bring forward a consistent knowledge, Has properly developed terminology. Is less laconic in expressing his thoughts regarding the raised question. Demonstrates knowledge of the main readers.</p> <p>7 points - Student has been able to present some information linked with the topic. Difficult to provide arguments on the questions; Demonstrate a complete answer, but inconsequential. Demonstrates knowledge of the main literature. Terminology is partially developed.</p> <p>6 points – Demonstrate complete, but inconsequential answer. Terminology is partially developed; Present mediocre level of knowledge. Make poor deductions.</p> <p>5 points - Student has been able to demonstrate inconsistent comments on the different perspectives on some of the issues. Terminology is partially developed. Present mediocre level of knowledge. Make poor deductions.</p> <p>4 points - Student demonstrates general overview of the topics. Terminology is not developed. Information sufficiently linked with the topic. Demonstrate irrelevant understanding of the literature.</p>

3 points – Student demonstrates general/superficial and inconsistent knowledge of the subject. No sufficient knowledge of the literature.

2 points - Student demonstrates general comments, no knowledge of the terminology, no consistency.

1 point – Student demonstrates insufficient answer, not terminology awareness, chronologic manner of the answer, mostly wrong, no knowledge of literature.

0 point - Student demonstrates not even elementary knowledge of the topics.

Laboratory work assessment criteria (max 10 p):

10-9 p: laboratory method is properly planned; student applies laboratory tools and equipment precisely; Is able to record accurately, determine made mistake and plan way to correct. Is able to analyze applied method and interpret the results. Laboratory work is performed accurately and thoroughly.

8-7 p: laboratory method is properly planned; student applies laboratory tools and equipment precisely; Is able to record accurately, determine made mistake and plan way to correct. However, he lacks skills to analyze results. Laboratory work is performed with minor faults.

6-5 p: laboratory method is properly planned; student cannot demonstrate relevant knowledge in laboratory tools and equipment application; Makes minor mistakes in using the tools; Records properly, but is not able to notice the mistakes; thus, is hard to find ways to correct. Laboratory work was performed minor faults.

4-3 p: laboratory method is planned with minor faults; student cannot demonstrate relevant knowledge in laboratory tools and equipment application; Makes minor mistakes in using the tools; Records properly, but is not able to notice the mistakes; thus, is hard to find ways to correct. Laboratory work was performed essential faults.

2-1 p: Laboratory work was planned with essential faults; student is almost unfamiliar with laboratory tools and equipment application; Records properly, but is not able to notice the mistakes; thus, is hard to find ways to correct. Laboratory work was performed essential faults.

0 ქულა: Student is absolutely unfamiliar with laboratory method and tools and equipment. The work is not performed.

Project preparation – presentation criteria (max. 10 p)

1. Problem Importance - 1 p;
2. Proper planning - 1 p;
3. Review of the literature (data) on the issue - 1 p;
4. Relevance of research methods with the research goal - 1 p;
5. Deductions accuracy and correlation with the main text - 1 p;
6. Accuracy of the cited literature, trusted sources - 1 p;
7. Writing accuracy -1 p;
8. Language and style accuracy – 1p;
9. Visual and technical sides of the material - 1 p;
10. Culture of dispute and listening - 1 p.

	<p>Midterm exam is a test (multiple choice) that contains 40 questions, each rated 0.5p.</p> <p>The student is allowed to pass the final exam, if he accumulates not less than 11 points for the mid-term evaluations (considering that he will get the maximum score at the final exam).</p> <p>Final exam is also the test (both open and closed questions). It consists of 60 open and closed multiple-choice questions; each one rates 0.5 p (30 p in total) and 10 open questions or situational tasks, each rating not more than 1p.</p> <p>Final exam is scored with not more than 40p.</p> <p>The final exam is considered to be passed if a student accumulates 70% or more of the maximum exam score (40X70 / 100 = 28 points).</p> <p>Credit is awarded to if student accumulates 51 p out of 100 p.</p> <p>Positive assessment:</p> <ul style="list-style-type: none"> • (A) Excellent - 91p and more; • (B) Very good - 81-90p; • (C) Good - 71-80 p; • (D) Satisfactory - 61-70 p; • (E) Enough - 51-60 p; <p>Negative assessment:</p> <ul style="list-style-type: none"> • (FX) didn't pass - 41-50p that means that student needs more work to pass it and is allowed to pass additional exam; • (F) failed – 40p or less that means that student shall take the course again. <p>The student has the right to pass an examination in the same semester. The interval between the final and additional exams to be not less than 10 days.</p>
The basic literature	<ol style="list-style-type: none"> 1. TIETZ FUNDAMENTALS OF CLINICAL CHEMISTRY AND MOLECULAR DIAGNOSTICS. CARL A. BURTIS, DAVIDE. BRUNS. ELSEVIER, SEVENTH EDITION, ISBN:978-1-4557-4165-6, 2013. 2. ADVANCES IN CLINICAL CHEMISTRY AND LABORATORY MEDICINE. TAUBER, RUDOLF, RENZ, H. BERLIN: WALTER DE GRUYTER, 2012
The auxiliary literature	

Course content

Nº	topics	Lecture (hours)	Group work/pract (hours)	lab
	<p>Intro: sampling and processing of the study material</p> <p>Preparation for laboratory studies, rules to take sample, smear making rules; laboratory arrangement rules;</p>	2	2	1

	<p>Blood tests</p> <p>Blood clinical analysis</p> <p>Counting of cells; determination of hemoglobin, hematocrit. Methods to determine the average erythrocyte volume (MCV), average hemoglobin volume (MCH) and average concentration of hemoglobin in red blood cells (MCHC). Study of morphological characteristics of erythrocytes; Leukocytes, blood formula. Neutrophils, basophils, eosinophils, lymphocytes, monocytes, platelets, plasmocytes.</p> <p>Method to determinine the erythrocyte sedimentation rate. Reticulocytes.</p>	3	2	2
	<p>Immunoematology studies; Blood typing</p> <p>Blood group and Rh typing methods. Filtration of blood samples in gel (agglutination and gel-filtration), agglutination with glass balls. Cross-reaction. Determination of "strong" A1, weak A2 and weaker (A3, A4, Ax –rarely) antigens. In case of A2 subtype discovery, importance of the additional research using the specific reagents. Coombs' direct and indirect method. Rhesus hidden antigens study.</p>	2	2	2
	<p>Coagulologic studies</p> <p>Thrombotic hemostasis. Bleeding time. PT, PI, INR- prothrombin time and international normalized ratio. The screening test of the external way of hemostasis. Thrombin time (TT) determination, APTT - activated partial thromboplastin time, optical clotting test. Clauss fibrinogen determination method. Coagulation time (Lee White). Lupus anticoagulant, anti-trombine.</p>	2	2	2
	<p>Midterm Exam</p>		2	
	<p>Immunological studies</p> <p>Determination of immunoglobulins. Determination of complement, Phenotyping of lymphocytes. Regulators and mediators of immunity. Allergy tests. Autoimmune disease markers.</p>	2	2	2
	<p>Onco markers and hormone tests</p> <p>Enzymoimmunoassay and immuno-chemi-luminescent methods [3, pg. 188-193]. Hypothalamic hormones, thyroid and sex hormones tests.</p> <p>Biochemical analysis.</p>	2	2	2

	Urine test Clinical analysis of urine, sediment microscopy, proteinuria, glucosuria, bilirubinuria, urobilinogenuria, ketone bodies, hematuria. Nechiporenko method.	2	2	1
16-19 weeks	Final exam		2	

Learning outcomes

Criteria	Competences
Knowledge and understanding	Has deep knowledge in the main directions of the Laboratory Service; knows research methods of the different biological fluids of the body; cytological, histological, biochemical, immunological and genetical methods of diagnostics; Knows modern diagnostic equipment and traditional laboratory methods; Understands the importance of the accuracy of laboratory diagnostic methods.
APPLYING KNOWLEDGE	Is able to carry out necessary and urgent analysis. Is able to plan tests based on modern methods applicable in the modern labs and to carry them out. Is able to select laboratory diagnostic methods properly and optimally and interpret test results correctly.
CONCLUSION SKILLS	Is able to discover laboratory error via result analysis based on the knowledge of Laboratory methods of equipment application skills.
COMMUNICATION SKILLS	Is able to communicate with any representative of medicine and the scientific research direction about technical side of the laboratory methods and as well as their interpretation and relevant application.
ABILITY TO LEARN	Is able to plan learning process, to search information about modern diagnostic methods, constantly update own knowledge.