

MED 3007- Clinical Biochemistry

Course Name	Code	Semester	Type of course	Theory (hours)	Application (hours)	ECTS
Clinical Biochemistry	MED 3007	V	Mandatory	20	51	5
Faculty, the educational program and education level	Medical Faculty, one-cycle Educational Program "Medicine"					
Author (s)	<p>EKA EKALADZE- INVITED TEACHER MOB: +995 595 633362; E-MAIL: ekaekaladze@yahoo.com Professor Leila Akhvlediani, Doctor of Biology Mob:593537072; T: +995422212535; Fax:+995422212537 Email: Leila.akhvlediani@bauinternational-uni.ge Nino Kurshbadze- Invited Teacher, Doctor of Chemistry Mob: 577220455; Email: n.kursh@yahoo.com Consultation day –individually, according to the agreement</p>					
Educational course format	LECTURE WORK IN GROUP					
Educational course volume	<p>Total: 150 hours Contact hours: 75 h, among them</p> <ol style="list-style-type: none"> 1. Lecture – 25 h 2. Laboratory -15 h 3. Team work – 44 h 4. Midterm Exam – 2 h 5. Final Exam -2 h <p>Independent work – 62 h</p>					
Prerequisites	MED 1001, MED 1003					
The purpose (s) of tutorial course/modules	<p>The aim of the learning course is to give students a comprehensive knowledge of clinical biochemistry theoretical issues as well as scientific, laboratory and technological principles. To achieve this goal are studied various organ dysfunctions and their molecular mechanisms, biochemical research ways. Also the correct interpretation of analysis results are used on diagnostics. Laboratory mistakes which are took place during the biochemical test and ways of prevention of mistakes.</p>					
Teaching and learning strategy	<p>Lectures will be conducted based on the application of verbal explanation method, demonstration- the method of visual presentation of the information. Laboratory work foresees doing experiments by the students themselves under the teacher's supervision that aims at elaboration of practical clinical skills; the students will also analyze the obtained results. Analytical method of demonstrating the issue is being studied and the methodological interpretation</p>					

	<p>are used by learning of each topic and stated in the syllabus.</p> <p>It's necessary for the critical analysis of the results of the biochemical research and for deep consideration of the molecular mechanisms of pathological conditions.</p> <p>In order to develop the skills of making conclusions supported by the arguments the students, during the group work, will defend and justify their opinions, when dealing with situation analysis, and analyze critically the situation created by their course mate. The students will also carry out the analysis of the clinical cases, interpret, classify, assess the data and make synthesis by means of connecting and confluencing of the components comprising the separate issues.</p> <p>Project preparation and presentation – student will chose the topic from the presented theme or independently, search for necessary materials and work with books, plan the project and it's expected results. The project should been presented in written form – typed on 10 pages in Power Point and defend the thesis before the audience.</p> <p>Discussion – students will be divided into groups in order to discuss the specific issue. The aim of the form of the activity is to develop the culture of listening to the opponent, critical thinking, analyzing and on the basis summing up opinions and conclusion skills.</p>
Assessment criteria	<p>Maximum score- 100</p> <p>Midterm assessment -60</p> <ul style="list-style-type: none"> • Activity on Laboratory – 10 score: • Activity on Group Work – 10 score: • Project preparation and presentation -10 score • Discussion -10 score • Midterm Exam – 20 <p>Laboratory Work is Assessed Based on the Following Criteria (maximum 10 scores):</p> <p>10-9 points: Laboratory method is planned correctly, the usage of the laboratory equipment and devices by the student is accurate. The student is able to make method recording correctly, can easily identify the mistakes made and plan the way of correction. The student is able to analyze the method exercised and interpret the results. Laboratory work is carried out accurately and completely;</p> <p>8-7 points: Laboratory method is planned correctly. The student reveals the relevant knowledge when applying laboratory equipment and devices. The student is able to make method recording correctly, easily identify the mistakes made and plan the way of correction, however, has difficulties in analyzing the results. Laboratory work is performed with minor faults.</p> <p>6-5 points: Laboratory method is planned correctly. The student is not able to reveal the relevant knowledge when using the laboratory equipment since he/she makes minor mistakes when applying laboratory devices; The student can make method recording correctly but is not able to detect the mistakes made and experiences difficulties in looking for the ways of correction. Laboratory work is carried out with minor faults.</p> <p>4-3 points: Minor mistakes are made in planning of the laboratory method; the student is not able to reveal the relevant knowledge when using laboratory equipment and devices, is able to make method recording correctly but is not able to detect the mistakes made and relevantly has difficulties in finding the way of correction. Laboratory work is carried out with essential faults.</p> <p>2-1 point: Essential mistakes are made in planning laboratory method; the student is hardly familiar with the rules of usage of laboratory equipment and devices; the student is able to make method recording but is unable to detect the mistakes made and relevantly has difficulties in finding the ways</p>

of correction. Laboratory work is carried out with essential faults.

0 point: the student is absolutely unaware of laboratory method and equipment and devices. The task is not fulfilled.

Application and Group Work are Assessed Based on the Following Criteria (maximum 10 scores)t
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.

9 points - Student has been able to bring forward a consistent number of deductions on most of the topics tackled. make very good comments on the different perspectives on most of the issues. Demonstrates knowledge of the main readers.

8 points - Student has been able to bring forward a consistent knowledge, Has properly developed terminology. Demonstrates knowledge of the main readers.

7 points - Student has been able to present some factual information sufficiently linked with the topic. demonstrate a good understanding of the topics selected. make a good attempt to bring forward a balanced view of some arguments on the issues. Terminology is partially developed.

6 points - Student has been able to make some good comments on the different perspectives on some of the issues. Make poor deductions on most of the topics tackled. analyse some causes and results of human interactivity related to the issues.

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.

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.

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.

Project Preparation and presentation - Grading criteria – Maximum 10 scores

- 1.Actuality of the problem – 1 sc;
- 2.Accurate planning – 1 sc;
- 3.Review of the literature on the issue -1sc;
- 4.Research methods relevance with the research goals – 1sc;
- 5.Logical argumentation and correlation with the main theme – 1sc;
- 6.Reference accuracy and correlation with the main source - 1sc;
- 7.Culture of writing – 1sc;
- 8.Language and style accuracy - 1sc;
- 9.Visual and technical side of the material – 1sc;
- 10.Culture of the discussion and listening to the opponent- 1 sc.

Discussion – grading criteria (maximum 10 scores)

- Critical thinking- 2 sc;

	<ul style="list-style-type: none"> • Culture of debates - 2 sc; • Argumentativeness - 2 sc; • Time management - 2 sc; • Academic and visual side of the presented material - 2 sc. <p>Midterm Exam - the written test – 40 questions, each question is rated as 0.5 scor. Minimal score of midterm assessment (for final exam) – is 11; to take in account that student will receive the maximum score at the final exam.</p> <p>Final Exam – 40 Is held in the written test form (test consists of 60 multiple-choice close questions, each question is rated as 0.5 score and 10 open questions each question is rated as 1 score). Students have to score equal or more than 70% from final exam maximum score (40X70/100=28 maximum 28 points from the overall 40) to pass the final examination. Credit will be given to the student if he has collected at minimum 51 scores out of 100. The students' assessment has to be done in the following way: Positive rate:</p> <ul style="list-style-type: none"> • (A) Excellent- 91 or more points; • (B) Very Good- 81-90 points; • (C) Good- 71-80 points; • (D) Satisfactory- 61-70 point; • (E) Enough- 51-60 points; <p>Negative rate:</p> <ul style="list-style-type: none"> • (FX) Failure - 41-50 points, which means that a student needs to work more and an independent and considerable further work is required to pass the exam once again to be re-awarded; • (F) Fail - 40 points or less, which means that the student's diligence is not sufficient and student has to learn the subject all over again. <p>The student can pass the additional exam during the same semester. The time interval between the final and the additional exams should be not less than 10 days.</p>
The basic literature	<ol style="list-style-type: none"> 1. CARL A. BURTIS, DAVIDE. BRUNS. TIETZ FUNDAMENTALS OF CLINICAL CHEMISTRY AND MOLECULAR DIAGNOSTICS. ELSEVIER, SEVENTH EDITION, ISBN:978-1-4557-4165-6, 2013. 2. Fleming DO, Hunt DL. Biological Safety Principles and Practices. ASM Press, Washington DC. 4th edition, 2006.
The auxiliary literature	Textbook of Biochemistry with Clinical Correlations, Devlin, 7th edition, John Wiley & Sons, Inc. 2009.

The tutorial/learning course content

week	Topics	Lecture (hour)	Work in group Appl. (hour)	Lab
1	Principles of Basic Techniques and Laboratory safety	3		3

	Analytical techniques and Instrumentation: Optical techniques, Electrochemistry and chemical sensors, Electrophoresis, chromatography, Mass spectrometry, Enzyme and rate analyses, Immunochemical Techniques, Automation			
	Homeostasis liquids and electrolytes. Physiological control on molecular level of gases and electrolytes of blood. The reasons of changes of electrolytes (sodium, potassium, magnesium, and others)	2	3	
	Interpretation of acid-alkaline violation, reasons of violation and treatment ways. Chronic and severe disorder of kidney's functions. Renal tubular defects. Dialysis. Functional test of kidney - creatinine Urea, and Uric Acid	2	3	2
	Amino acids, peptides and proteins, proteins of extract	2	3	2
	Digestive intestine and exocrine pancreatic function and immunological aspects of the alleged pathological conditions of the digestive tract	2	3	
	Liver disease research and general enzymologia	2	4	
	Midterm Exam		2	
2	Cardio vascular diseases , including cardiovascular risk factors and laboratory assessment of possible biomarkers	2	4	2
	Hemoglobin, ferrum and bilirubin	2	5	2
	Porphyrin therapeutic drugs and their management	2	3	
	Biochemical aspects of nutrition, monitoring of nutrition status and nutrition characteristics	2	5	
	Toxicology, metabolic aspects of drugs, toxicological patients examination	2	3	2
	Tumor markers for early diagnosis of cancer screening and diagnostic tools, therapy monitoring and ideal marker	2	3	2
16-19	Final Exam		2	

Learning Outcomes

Criteria	Competences
Knowledge and understanding	After completion the learning course student will know: <ul style="list-style-type: none"> - Biochemical aspects of physiological and pathological processes in organism on the molecular level;

	<ul style="list-style-type: none"> - The basis clinical biochemical research methods; - Electrochemical, electrophoresis, chromatography, mass spectrometry and immunochemical methods methodology, their capabilities and limits. Specific biochemical test for liver and kidney examinations, identification methods for blood gases and electrolytes, vitamins and toxic substances, the capabilities and limits of these tests.
Application of knowledge	<p>Student will be able to:</p> <ul style="list-style-type: none"> - Identify and explain differences between normal physiological functions and pathological dysfunctions; - Calculate the caloricity of nutrition components; - By means of biochemical diagnostic testing methods effectively estimate the diagnosis and treatment methods; - Interpret of laboratory test results; - Select independently research methods; - Perform some methods independently; - Search for the new original methods for solve the complex problem.
Making Judgements	<p>Student will be able to:</p> <ul style="list-style-type: none"> - Based on the comprehensive and incomplete information and critical thinking make the proper conclusions; - Correct interpretation of test results, detection of the errors and correct them
Communication Skills	<p>Student will be able to discuss conclusions, arguments and research results with academic and professional community. To present information by effective use of information and communication technologies</p>