

**MED 3019 - Research Methods in Molecular Biology and Genetics**

Course Name	Code	Semester	Type of course	Theory (hours)	Work in Group (hours)	ECTS
Research Methods in Molecular Biology and Genetics	MED 3019	VI	Elective Course	6	20	2
Faculty, the educational program and education level	Faculty of Medicine, one-cycle Educational Program "Medicine"					
Author (s)	<b>Sophiko Tskvitinidze</b> - Assistant professor, Dr. of Biology TEL: +995 593 744 133 /+ 995 599 122 633; E-MAIL: <a href="mailto:tskvitinidze.s@gmail.com">tskvitinidze.s@gmail.com</a> Consultation days and time: individually					
Educational course format	<b>Total:</b> 60 hours <b>Contact hours:</b> 30 h, that includes: <ol style="list-style-type: none"> <li>Lecture – 6 h</li> <li>Group work – 20 h</li> <li>Midterms – 2 h</li> <li>Final exam -2 h</li> </ol> <b>Independent work</b> – 30 h					
Prerequisites	None					
The purpose (s) of tutorial course/modules	To gain information about molecular diagnosis of genetic disorders in both as theoretical as practical levels and acquire skills of interpretation of the experiment results.					
Teaching and learning strategy	<b>Lectures</b> - Monologue, explanation, demonstration (video, Power-point); <b>Demonstration</b> illustrations, slides and other visual aids; <b>Discussion</b> – questions and answers, answers analysis supported with visual aids; <b>Brief-inquire</b> (3)–short questions and answers; <b>Work with additional literature:</b> independent working, searching of literary materials from the Internet and other information technology sources; processing of information; <b>Abstract preparation and presentation</b> - Students choose material from offered problematic topics or independently, search for appropriate material, will work with the books and present about 10 printed pages in PowerPoint format in auditorium for estimation.					
Assessment criteria	<b>Maximum score- 100:</b> <ol style="list-style-type: none"> <li><b>Midterm assessment -60 score</b>, that includes:                         <ul style="list-style-type: none"> <li>Attendance -1 score (1X10=10 scores);</li> <li>Activity – 10 scores;</li> <li>Abstract preparation and presentation-10 scores;</li> <li>Discussion -10 scores;</li> <li><b>Midterm Exam – 20 scores</b></li> </ul> </li> </ol>					

The final score will be accounted as arithmetical average.

**Group Work is Assessed Based on the Following Criteria** (maximum scores)

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

**7 scores** - 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 scores** - 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 scores** - 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 scores** - Student demonstrates general overview of the topics. Terminology is not developed. Information sufficiently linked with the topic. Demonstrate irrelevant understanding of the literature.

**3 scores**- Student demonstrates general/superficial and inconsistent knowledge of the subject. No sufficient knowledge of the literature.

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

**1 score** - Student demonstrates insufficient answer, not terminology awareness, chronologic manner of the answer, mostly wrong, no knowledge of literature.

**0 score:** Student demonstrates not even elementary knowledge of the topics.

**Discussion – grading criteria (maximum 10 scores)**

- Critical thinking- 2 sc;
- Culture of debates - 2 sc;
- Argumentativeness - 2 sc;
- Time management - 2 sc;
- Academic and visual side of the presented material - 2 sc.

**Abstract preparation and presentation's criteria (10 scores - max.):**

1. Actuality of appointed problem – 2 score;
2. Research observation in the write of topic -2 sc.
3. Correctness of conclusion and the connection with the main text - 2 score
4. Writing culture – 2 sc.
5. Visual and technical side of the material – 1sc;
6. Accuracy and reliability of indicated references and literature sources – 1 score;

**Midterm Exam – 20 scores**

	<p>Written test -40 question, 0,5 score for each –total 20scores;  <b>Minimal scores of midterm assessment (for final exam) – is 11.</b></p> <p><b>2. Final Exam -40 scores</b></p> <p>Is held in the written test form (test consists of 80 questions, each question is rated as 0,5 score)- total 40 scores.</p> <p>The final exam would accounted as passed in case of maximum 70% or more (<math>40 \times 70 / 100 = 28</math> scores).</p> <p>Credit will be given to the student if he has collected at minimum 51 scores out of 100.</p> <p>Student's assessment has to be done in the following way:</p> <p><b>Positive rate:</b></p> <ul style="list-style-type: none"> <li>• (A) Excellent- 91 or more scores;</li> <li>• (B) Very Good- 81-90 scores;</li> <li>• (C) Good- 71-80 scores;</li> <li>• (D) Satisfactory- 61-70 scores;</li> <li>• (E) Enough- 51-60 scores;</li> </ul> <p><b>Negative rate:</b></p> <ul style="list-style-type: none"> <li>• (FX) Failure - 41-50 scores, 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;</li> <li>• (F) Fail – 40 scores or less, which means that the student's diligence is not sufficient and student has to learn the subject all over again.</li> </ul> <p>Student can pass the additional exam during the same semester.</p> <p>The time interval between the final and the additional exams should be not less than 10 days.</p>
<b>The basic literature</b>	<p>1. David L. Rimoin's, Reed E.Pyeritz, Bruce R.Korf. <b>Essential Medical Genetics</b>, Elsevier Saunders, 2013</p>
<b>The auxiliary literature</b>	<p>2. Alberts B, Johnson A, Lewis J, Raff M, Molecular Biology of the Cell, 5. ed, Garland Science, New York, 2008</p> <p>3. Abraham L.Keirszenbaum, Laura L.Tres - Histology and Cell Biology, Elsevier Saunders, 2012;</p> <p>4. Bruce Alberts, Alexander Johnson, Julian Levis, Martin Raff keith Roberts Peter Walter - Molecular Biology of the Cell, Garland Science Taylor &amp; Francis Group, 2008</p>

#### The tutorial/training course content

№	Subjects	Lecture (hour) 6	Work in group (hour) 14
1	Review of genetic diseases those caused by molecular disorders.	1	3
2	Genetic testing and applications in medicine.	1	3

3	Bio-safety and Laboratory working rules. Genetic laboratories. Isolation of genomic DNA, quality control of DNA.	1	3
	<b>Midterm exam</b>		2
4	Detection method - Spectrophotometry. Polymerase chain reaction (PCR). Quantification method, electrophoresis.	1	3
5	Single mutation analysis methods. Restrictive Fragment Length Polymorphism reaction (RFLP).	1	3
6	Gene expression analysis (RNA level). Gene expression analysis (Protein level). Interpretation and processing of experiment results.	1	5
	<b>Final Exam</b>		2

### Learning Outcomes

Criteria	Competences
<b>Knowledge and understanding</b>	At the end of the course students will have necessary knowledge to access the molecular basis of genetic disorders, genetic testing methods and understands an importance for diagnostics. Will know Lab methods of: DNA extraction, amplification (PCR), Quantitative and Qualitative determination, Restrictive Fragment Length Polymorphism reaction (RFLP) and its importance in population genetic researches, Electrophoresis.
<b>Applying knowledge</b>	By using the Gene expression analysis experimental methods students will be able to interpret obtained results. They will be able to use obtained knowledge in the working in diagnostic lab. Will be able to plan experiments independently in laboratory using different aforementioned gene expression analysis methods. Will gain practical experience of usage of basic techniques related with genetic analysis. they will have laboratory working skills.
<b>Making Judgment</b>	Students will be able to perform experiment results into theoretical conclusions and generalize issues. Students will be able to perform experiment results into theoretical conclusions and generalize issues.
<b>Communication Skills</b>	Experiment realization and result processing process needs active communication in the group, hence it develops the communication skills in each students. At the end of the course students will be able to discuss obtained results and share their attitudes to colleagues and auditorium.