

American University of Beirut

Faculty of MEDICINE

Department of PATHOLOGY & LABORATORY MEDICINE

LABM 233

Genetics and Molecular Biology

Academic Year 2023-2024

<u>Course</u>	Rami Mahfouz MD, MPH	<u>Course</u>	
<u>Coordinator:</u>		<u>Credits:</u>	2
<u>Office Hours:</u>	7:00am – 6:00pm	<u>Course</u>	AUB, Van Dyck 203
		<u>Meeting:</u>	
<u>Office</u>	AUBMC, Department of	<u>Course Time:</u>	M / W 13:00- 13:50
<u>Location:</u>	Pathology, Third floor, W-327		
<u>Office</u>	5167		
<u>Extension:</u>			
<u>E-mail</u>	rm11@aub.edu.lb		

Course Description:

In this course, the senior Medical Laboratory Technology students will be exposed to a variety of introductory lectures in Molecular diagnostics and Cytogenetics in addition to advanced techniques currently available in most recently established laboratories. **LM233 Genetics and Molecular Biology** introduces the students to basic human genetics, techniques of molecular diagnosis of inherited and acquired genetic diseases and their modes of inheritance and reaches a higher level of advanced technology applications in cancer, pathology and microbiology using up-to-date molecular tools.

Specific Learning Outcomes:

Upon completion of this course, students should be able to:

1. Learn the basics of Polymerase Chain Reaction
2. Understand the difference between the variable molecular tools
3. Understand the rationale behind applying different molecular techniques based on the ultimate reason for testing: Clinical or research
4. Learn basic concepts related to cell culturing, karyotyping, and biochemical genetics.

Course Content:

1. Introduction to Genetics and Molecular Diagnostics
2. Restriction Enzymes
3. Sequencing and Indirect Mutant Gene Tracking
4. Direct Mutant Gene Tracking - Unknown mutations
5. Direct Mutant Gene Tracking - known mutations
6. Use of RT-PCR in Molecular Pathology
7. Molecular HLA Typing
8. DNA Microarray Technology
9. Cancer Genetics
10. Applications in Molecular Diagnostics
11. Cytogenetics I
12. Cytogenetics II
13. Chromosome Abnormalities I
14. Chromosome Abnormalities II
15. Modes of inheritance: Mendelian pattern
16. Modes of inheritance: Non-Mendelian pattern
17. Biochemical Genetics I
18. Biochemical Genetics II
19. Aspects of genetic research I
20. Aspects of genetic research II
21. Genetic Counseling
22. Gene Therapy
23. Advanced special molecular testing
24. The era of Next Generation Sequencing
25. Ethics in genetic testing
26. Bioinformatics

Course Schedule

Date	Lecture Topic	Lecturer
M Aug 28	Introduction to Genetics and Molecular Diagnostics	R. Mahfouz
W Aug 30	Restriction Enzymes	R. Mahfouz
M Sept 4	Sequencing and Indirect Mutant Gene Tracking	R. Mahfouz
W Sept 6	Direct Mutant Gene Tracking - Unknown mutations	R. Mahfouz
M Sept 11	Direct Mutant Gene Tracking - known mutations	R. Mahfouz
W Sept 13	Use of RT-PCR in Molecular Pathology	R. Mahfouz
M Sept 18	Molecular HLA Typing	R. Mahfouz
W Sept 20	DNA Microarray Technology	R. Mahfouz
M Sept 25	Cancer Genetics	R. Mahfouz
M Oct 2	Applications in Molecular Diagnostics	R. Mahfouz
Mid-Term Exam		
W Oct 4	Modes of Inheritance: Mendelian inheritance	N. Assaf
M Oct 9	Modes of Inheritance: Non-Mendelian inheritance	N. Assaf
W Oct 11	Cytogenetics I	N. Assaf
M Oct 16	Cytogenetics II	N. Assaf
W Oct 18	Chromosome abnormalities I	N. Assaf
M Oct 23	Chromosome abnormalities II	N. Assaf
W Oct 25	Genetic Counseling	N. Assaf
M Oct 30	Biochemical Genetics I	R. Daher
W Nov 1	Biochemical Genetics II	R. Daher
M Nov 6	Ethics in genetic testing	R. Mahfouz
W Nov 8	Gene Therapy	R. Mahfouz
M Nov 13	Advanced Special Molecular Testing	R. Mahfouz
W Nov 15	Aspects of genetic research I	S. Yazbek
M Nov 20	Aspects of genetic research II	S. Yazbek
M Nov 27	Next Generation Sequencing	R. Mahfouz
W Nov 29	Bioinformatics: Basics and principles	P. Khoueiry
Final Exam		

Evaluation:

Midterm: **50%**
 Final: **40%**
 Attendance and participation: **10%**

Recommended References / Books:

Henry. Clinical Diagnosis and Management by Laboratory Methods. Saunders, Edition 2012.

Course Policy:

1. Attendance: You are expected to attend all classes and participate in class activities. If you miss a class, it is your responsibility to make up for the material missed and inquire about any announcements made. If you miss more than one fifth of class sessions, you are subject to withdrawing from the course with a-w-grade. Please refer to the AUB catalogue.
2. Exams: Examinations must be taken as scheduled. **Make up exams will not be given unless a valid excuse is given.** Only authorized medical reports will be accepted.
3. Withdrawal date: Please observe withdrawal dates set by the Registrar's Office.
4. Cheating and Plagiarism: **Cheating and plagiarism will not be tolerated.** Kindly review the Student Code of Conduct in your handbook and familiarize yourself with definitions and penalties. If you are in doubt about what constitutes plagiarism, please ask your instructor because it is your responsibility to know. **The American University of Beirut has a strict anti-cheating policy.** Penalties include *failing marks* on the assignment in question, *suspension* or *expulsion* from University and a *permanent mention of the disciplinary action in the student's records*.
5. AUB strives to make learning experiences as accessible as possible. If you anticipate or experience academic barriers due to a disability (including mental health, chronic or temporary medical conditions), please inform me immediately so that we can privately discuss options. In order to help establish reasonable accommodations and facilitate a smooth accommodations process, you are encouraged to contact the Accessible Education Office: accessibility@aub.edu.lb; +961-1-350000, x3246; West Hall, 314
