

Course Plan

Number of students: 8

Semester: Second

Year: 2025

Department: Medical Bacteriology

Major: Master's Degree in Medical Microbiology

Credit: 2

Course Title: Molecular Diagnostic Bacteriology

Course Type: Practical

Day & Time: Monday, 08:00–10:00

Prerequisite: Molecular Biology, General Bacteriology

Instructor: Dr. Milad Shahini

Email: [shahini.m@skums.ac.ir]

Office Address: Faculty of Medicine, Shahrekord University of Medical Sciences

Response Hours and Days: Saturdays to Wednesdays, 8:00–15:00

Main Objective:

To familiarize students with molecular tools and techniques used in the identification, typing, resistance analysis, and manipulation of bacterial pathogens in clinical and research settings.

Learning Outcomes:

- Utilize molecular databases for bacterial sequence analysis.
- Design primers for PCR-based applications.
- Understand molecular principles of bacterial strain typing.
- Perform molecular techniques for detection of antibiotic resistance genes.
- Execute DNA extraction, plasmid isolation, and buffer preparation.
- Apply ribotyping, RFLP, MLST, PFGE, and sequencing methods.
- Conduct PCR, qPCR, and gene silencing methods.
- Perform cloning and hybridization-based assays.

References (Textbooks):

- "Molecular Genetics of Bacteria," by Larry Snyder and Wendy Champness.
- "Diagnostic Molecular Microbiology," ASM Press.

- Supplementary journal articles and protocol handbooks provided during the course.

Student Evaluation and Weight:

- Class Participation and Discussions: 3 marks
- Lab Reports and Practical Skills: 5 marks
- Midterm Exam: 6 marks
- Final Exam: 6 marks
- Total Marks: 20

Students Responsibilities:

- Participate actively in both theoretical and laboratory sessions.
- Follow molecular lab safety protocols precisely.
- Submit lab reports and assignments on time.
- Absenteeism without justification affects final grades.

Discipline and Educational Rules:

Follows the regulations of the Ministry of Health and the university's academic policies.

Course Schedule:

Session	Date	Topic	Instructor
1	[2025/04/07]	Introduction to Molecular Databases	Dr. Milad Shahini
2	[2025/04/14]	Primer Design I	Dr. Milad Shahini
3	[2025/04/21]	Primer Design II	Dr. Milad Shahini
4	[2025/04/28]	Molecular Principles of Bacterial Strain Typing	Dr. Milad Shahini
5	[2025/05/05]	Molecular Detection of Antibiotic Resistance	Dr. Milad Shahini
6	[2025/05/12]	Molecular Lab Safety, Buffer and Solution Preparation	Dr. Milad Shahini
7	[2025/05/19]	Bacterial Culture and DNA Extraction	Dr. Milad Shahini

8	[2025/05/26]	Ribotyping	Dr. Milad Shahini
9	[2025/05/27]	RFLP (Restriction Fragment Length Polymorphism)	Dr. Milad Shahini
10	[2025/06/02]	Plasmid Extraction Techniques	Dr. Milad Shahini
11	[2025/06/03]	Silencing Methods in Bacteria	Dr. Milad Shahini
12	[2025/06/09]	PCR and Sequencing Techniques	Dr. Milad Shahini
13	[2025/06/10]	MLST (Multilocus Sequence Typing)	Dr. Milad Shahini
14	[2025/06/16]	PFGE and Enzymatic Digestion	Dr. Milad Shahini
15	[2025/06/17]	Quantitative PCR (qPCR)	Dr. Milad Shahini
16	[2025/06/23]	Cloning, Blotting and Hybridization Techniques	Dr. Milad Shahini

Midterm Exam Date: [To be determined]

Final Exam Date: [To be determined]