

# MICB 322: MOLECULAR MICROBIOLOGY LABORATORY

## Course Overview:

This is an introductory Microbiology lab course intended to introduce students to basic skills such as aseptic handling, laboratory cultivation, genetic manipulation, phenotypic and genotypic characterization of bacteria. The course consists of one 2 hour lecture/tutorial and one 4 hour lab session per week.

## Course Materials:

There is no commercial textbook required for MICB 322. Weekly lab protocols and other materials (lecture slides, notes, etc.) will be posted on CANVAS.

## Learning Outcomes:

Upon completion of MICB 322 students will be able to:

1. Demonstrate how to work safely and effectively in a laboratory setting.
2. Demonstrate how to set up an aseptic working environment.
3. Explain the theory behind all the techniques used in the MICB 322 laboratory and apply the theory in new contexts.
4. Interpret and present experimental data.
5. Organize written and oral forms of communication to convey scientific information to a general audience in a concise and professional manner.
6. Prepare and maintain detailed scientific records.

## Course Assessment:

Midterm Exam	15%
Cumulative Final Exam	35%
Quizzes	5%
Assignment 1 (Annotated Bibliography)	5%
Assignment 2 (Peer Assessment of Practical Skills)	5%
Verbal Report	5%
Executive Report	10%
Laboratory Notebook Checks	10%
Performance/Lab Citizenship	10%

## Course Schedule:

Lab 1	Lab 2	Lab 3	Lab 4	Lab 5	Lab 6	Lab 7	Lab 8	Lab 9	Lab 10	Lab 11
Preparation of LB plates.  Cultivation of Microorganisms and Aseptic Transfer.  Staining and Microscopy Techniques.	Pipetting and Dilution Techniques  Introduction to spectrophotometry	Preparation of materials for growth curve.	Growth Curve	Preparation of sample material for PCR.	PCR	Agarose gel electrophoresis of PCR products.  Oral report of growth curve data.	Repeat PCR with modifications.	Agarose gel electrophoresis of PCR products.		LAB Cleanup.  Final lab notebook check.
Isolation of Staphylococcal species from normal flora.	Selection of probable Staphylococcal species from normal flora: Oxidase, catalase, Gram stain, shape.	Preparation of cultures for antibiotic sensitivities.	Assessment of Antibiotic Sensitivities of Staphylococcal species.	Identification of Staphylococcal Species by Rapid Biochemical Testing (API)	Complete API Testing.  Immunological Identification of <i>Staphylococcus aureus</i> .	Summarize Staphylococcal data for executive report.		Perform further testing proposed in executive report.	Perform further testing proposed in executive report.	Perform further testing proposed in executive report.
		Genomic DNA isolation.  Agarose gel electrophoresis of genomic DNA.  Determination of genomic DNA yield and purity.		Restriction digestion.  DNA fragment and plasmid ligation.  Purification and concentration by EtOH precipitation.	Transformation of electrocompetent cells.	Selection of transformed colonies.	Isolation of plasmid DNA.  Determination of plasmid DNA yield and purity.  Preparation of plasmid DNA for Sequencing.	Peer review of laboratory skills.	Sequencing data analysis.	