

SEMESTER I & II
LSM2202A – EXPERIMENTAL MOLECULAR AND CELL BIOLOGY

Prerequisite: LSM1101 and/or LSM1102

Workload: 12 lecture hours + 30 laboratory hours + 8 tutorial hours

This module introduces students to the theory and practical applications of techniques relevant to molecular and cell biology. The module emphasizes problem-solving exercises in the application of commonly used recombinant DNA techniques, including gel electrophoresis of DNA, RNA isolation and analysis, polymerase chain reaction (PCR), construction of recombinant DNA molecules, DNA sequencing and analysis, and real-time PCR. The objective for the students is to learn HOW to perform the experiments, and to understand WHY these experiments have to be carried out in a certain way.

Lecture Topics	Practical Topics
Overview on the course and on the importance and applications of molecular and cell biology	
Molecular cloning of genes: Recombinant DNA, restriction enzymes, cloning vectors and DNA libraries	Restriction digestion analysis & gel electrophoresis of DNA
	Construction of recombinant DNA molecules: DNA ligation and transformation
RNA analysis: Messenger RNA, isolation of total RNA and mRNA, and methods to analyze gene expression	RNA analysis: Isolation, quantification, and gel electrophoresis
	Reverse transcription and polymerase chain reaction (RT-PCR)
DNA Sequencing	DNA Sequencing: Sequencing reactions, DNA sequencer and sequence data retrieval/analysis
Real-Time PCR	Real-Time PCR: SYBR-green and TaqMan assay
Lectures:	12h
Practicals:	30h
Tutorials:	8h
Total hours:	50h

Reference Manuals: Current Protocols in Molecular Biology by Fred M. Ausubel, Roger Brent, Robert E. Kingston, David D. Moore, J.G. Seidman, John A. Smith, and Kevin Struhl. John Wiley & Sons, Inc.

Module Coordinators:

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Module Assessment:

Lab reports: 10%; Midterm CA: 30%; Final CA: 60%