

PROGRAM-SPECIFIC COMPETENCIES - BIOCHEMISTRY/ MICROBIOLOGY

Competencies are the skills, knowledge and attributes gained through every work, educational, volunteer and life experience.

UVic students in the [Biochemistry/Microbiology](#) programs develop the following program-specific competencies. We worked with the Department of Biochemistry/Microbiology to develop this document.

BIOCHEMISTRY KNOWLEDGE

Acquires knowledge and skills to obtain a professional position or pursue graduate/professional training in biochemistry or molecular biology

- + Examines the structure and function of proteins
- + Understands the principles and analysis of kinetic mechanisms
- + Uses proteomics, protein interactions in binding and catalysis
- + Understands the structure of function of carbohydrates
- + Uses an understanding of the structure and function of lipids
- + Examines biological membranes and bioenergetics
- + Understands metabolic processes and their control
- + Acquires knowledge of the structure and function of DNA, RNA and genes
- + Applies an understanding of gene expression in eukaryotes
- + Explores the biochemical basis of signal transduction

MICROBIOLOGY AND IMMUNOLOGY KNOWLEDGE

Acquires knowledge and skills to obtain a professional position or pursue graduate/professional training in microbiology or immunology

- + Applies an understanding of prokaryotic and eukaryotic cell structure and function; physiology and growth of microorganisms; molecular taxonomy of microorganisms
- + Understands microbial genetics and genomics
- + Studies microbial cell biology using molecular approaches
- + Explores immunology, generation of antibody diversity, immune effect or mechanisms, immunological principles
- + Understands molecular virology, animal viruses
- + Examines developments and applications of molecular biotechnology
- + Acquires knowledge of microbial pathogenesis, molecular mechanisms of pathogenesis

SCIENTIFIC METHOD

Understands and uses the principles of the scientific method and the application of experimental techniques to solve specific problems

- + Uses effective literature search strategies and critically evaluates the scientific literature
- + Applies knowledge and understanding of new and emerging applications of biochemistry, microbiology and biotechnology
- + Gathers empirical and measurable evidence through observation and experimentation
- + Analyzes data and formulates a clear, answerable question
- + Uses inductive reasoning and deductive methods to develop a testable, falsifiable hypothesis and predict expected results
- + Designs quantitative approaches/experiments to test and evaluate hypothesis
- + Observes and records the results of the research
- + Uses mathematical and statistical methods and analytical tools to evaluate the data
- + Draws conclusions
- + Communicates the results and ideas in scientific reports and papers and oral presentations and/or conducts further research
- + Develops written and oral skills that enable clear and effective communication

COMPUTATION

Develops and uses scientific software to support research endeavors

- + Creates and modifies scientific software
- + Utilizes scientific software effectively
- + Develops and uses computation modeling as a proxy for physical experimentation
- + Develops and uses computational methods to analyze large data sets

FIELD WORK

Conducts research in the field

- + Observes behavior/properties of subjects/phenomena of interest in situ
- + Makes measurements of the subjects/phenomena or their environment
- + Identifies and collects samples for analysis
- + Operates and uses equipment/tools/machinery appropriately

LABORATORY WORK

Uses practical and safe techniques within a laboratory setting

- + Uses safe and careful practices at all times
- + Keeps accurate laboratory records
- + Practices good sterile and aseptic techniques
- + Practices good pipetting technique
- + Practices basic skills associated with performing laboratory experiments in biochemistry and microbiology by following standard methods and procedures
- + Takes precise and accurate measurements and gains appreciation of potential sources of error associated with laboratory measurements
- + Troubleshoots and optimizes methods and techniques
- + Develops methods and procedures
- + Analyzes, synthesizes, purifies, modifies and/or characterizes compounds, samples, or devices
- + Uses instrumentation appropriately (calibrates, maintains and troubleshoots instrumentation)
- + Gains experience critically evaluating data generated

EDUCATION AND TRAINING

Instructs co-workers in scientific procedure

- + Teaches scientific concepts and knowledge at a level appropriate to the audience
- + Assesses achievement of learning outcomes
- + Trains and supervises others to perform scientific/laboratory procedures