Biochemistry/Microbiology

Program-specific competencies

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.

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
Scientific method cont.

- 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
- Trouble shoots 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

UVic Co-op and Career worked with the Department of Biochemistry and Microbiology to develop this competency document.