

## **SC/BIOL 2070 3.0**

### **Research Methods in Cell and Molecular Biology**

#### **Course description:**

The course focuses on laboratory techniques in the life sciences. Practical research skills are developed through experiential learning (via integrated and relevant laboratory techniques). Research skills include scientific writing, data analysis/interpretation, experimental design and hypothesis testing. Practical experience with current techniques in cellular/molecular biology is gained in the laboratory. One online lecture hour\* and six laboratory/practical hours **per week**. One term. Three credits. (\*Lectures are provided using multimedia formats.)

Prerequisites: SC/BIOL 1010 6.0 or SC/BIOL 1000 3.0 and SC/BIOL 1001 3.0.

**Course Directors:** Dr. E. Rosonina

**Course web site:** <https://moodle.yorku.ca>

**Course email:** [biol2070@yorku.ca](mailto:biol2070@yorku.ca) (will be active as of Sept. 8<sup>th</sup>)

#### **Overview**

BIOL 2070 is a second year laboratory course which focuses on development of research skills including scientific writing, data analysis/interpretation, experimental design and hypothesis testing. This course also provides students with hands-on laboratory experience using current cell, biochemical and molecular biology techniques. The course builds on the the knowledge and understanding gained in first year biology (BIOL 1000 and 1001).

#### **Learning Objectives**

- Experimental design and hypothesis testing;
- Data interpretation, including standard curve interpolation (graphing) and determining molecular weight of an unknown protein or genotype;
- Critical thinking and assessment of current scientific publications;
- Scientific writing of results and data analysis;
- Use of model organism(s);
- Genetic engineering in microorganisms (e.g., bacteria, yeast);
- DNA analysis, including DNA extraction, use of restriction enzymes, polymerase chain reaction and gel electrophoresis;
- Identification of genetic inheritance patterns based on genotype and phenotype including sex-linked traits;
- Fluorescence microscopy procedures and identification of cellular components.
- Spectrophotometry, chromatography and enzymatic assays;

- Making dilutions and buffers;
- Protein analysis via SDS-PAGE

## **Course Organization**

The course is organized into an orientation followed by four modules. All students start with the Scientific Writing Module (five sessions), then rotate through the remaining modules, which are held in different rooms in the Life Science Building (LSB). Different lab sections follow a different order of modules. Each module has five lab days.

## **Modules**

- Module 1: Scientific Writing (dry) (Refer to Moodle for locations)
- Module 2: Genetics (wet) in Life Sciences Building (LSB) 221
- Module 3: Cell Biology (wet) in Life Sciences Building (LSB) 223
- Module 4: Biochemistry (wet) in Life Sciences Building (LSB) 225

The Life Sciences Building (LSB) is located behind the Petrie and Chemistry buildings. Wet labs will be on the 2<sup>nd</sup> floor of the LSB. Please use the designated entrance and make your way to the 2<sup>nd</sup> floor.

## **Texts and Resources**

- Reed et al. (2012) Practical Skills in Biomolecular Sciences, 4<sup>th</sup> ed. Pearson Education.
- BIOL 2070 Resource Manual (available in the bookstore)
- Hard cover Lab Notebook with numbered pages.
- Moodle website
- Highly Recommended: McMillan, V.E. (2012) Writing Papers in the Biological Sciences. Bedford Books

## **Course Evaluation**

|                          | Percent (%) |
|--------------------------|-------------|
| Genetics (Wet)*          | 20          |
| Microscopy (Wet)*        | 20          |
| Biochemistry (Wet)*      | 20          |
| Scientific Writing (Dry) | 20          |
| Final Exam               | 20          |
|                          |             |
| Total                    | 100         |

Additional information including detailed learning objectives and evaluation breakdown is provided in the course resource manual.