

Biology 3VV3: Laboratory Methods in Molecular Biology Winter 2019

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Course Description:

This is a lab course offered to students who are interested in gaining some laboratory experience in techniques common to molecular biology. The course is centered on six standard molecular biology topics and seeks to develop the students' technical skill and practical knowledge required to perform each procedure. We will be using the nematode *C. elegans* as a model system for several of the projects to be undertaken. This is a lab intensive course and as such you will be expected to complete all of the labs. Accommodation for absence from the lab due to extenuating circumstances will be evaluated on an individual basis.

Course Objectives:

By the completion of this course, you will:

- Understand the background and theory of basic molecular biology techniques currently being used in industry and academic research labs.
- Have utilized techniques to carry out molecular biology experiments from set-up to data analysis
- Have gained essential research skills including the ability to organize research efficiently, multi-task, troubleshoot, identify caveats, analyze and interpret results, and communicate research findings.
- Understand the use of model organisms for investigating genetic diseases.

Lectures: Location HH 102, Tuesdays 12:30 – 1:20pm

Labs: L01 Monday and Wednesday 2:30 – 5:20, L02 Tuesday & Thursday 2:30-5:20, in LSB 103

Some lab activities will not require the full three-hour period. However, it will sometimes be necessary to come in briefly at other times during the week to observe cultures or collect data from ongoing experiments.

Prerequisites:

Biology 2B03 (or ISCI 2A18), Biology 2C03, registration in an Honours Biology or Honours Life Sciences program. Completion of BIOSAFE 1B50 and WHMIS 1A00 are required to work in the labs.

Format:

There will be one lecture per week to discuss the background and theory to the laboratory components or to present additional related topics. Two laboratory sessions each week ensure sufficient time to allow students to develop skills, and carry out experiments from set up to data analysis. Attendance in the labs is mandatory.

Textbook and Materials

- There is no required textbook. Required readings will be linked to the course Avenue site (<https://avenue.mcmaster.ca>).
- The Lab Manuals will be available for download and printing on Avenue.
- You are required to use a notebook with fixed pages to record your work (available at the Campus Bookstore). You may use a notebook previously used for another course, provided that sufficient empty pages remain.
- A lab coat must be worn at all times in the lab. Safety glasses or goggles are recommended for several of the labs. These items can be purchased at the Campus Bookstore.

Course Evaluation:

Test 1: 20%

Test 2: 25%

Lab assignments: 15% (2 @ 2.5%, 2 @ 5%)

Lab reports: 20% (2 @ 10%)

PBL project: 15% (report 10%, presentation 5%)

Lab notebooks and participation: 5%

Changes to the course outline: At certain points in the course it may make good sense to modify the schedule outlined below. The instructors reserve the right to modify elements of the course and will notify students accordingly (in class and post any changes onto Avenue to Learn). Posted changes take precedence over this course outline. This applies to the lab component, as well.

Lecture Schedule:

Week 1 (Jan 8th) - The scientific method & central dogma of molecular biology

Week 2 (Jan 15th) - *C. elegans* & *E. coli*; Isolating and quantifying genomic and plasmid DNA

Week 3 (Jan 22nd) - DNA technologies: PCR, restriction digests, ligations, transformations

Week 4 (Jan 29th) - Reporter genes & over-expression systems; Test #1 review

Week 5 (Feb 5th) - Protein technologies: SDS-PAGE, Western blot

Week 6 (Feb 12th) - Test #1 in class

Week 7 (Feb 18th) – MIDTERM RECESS

Week 8 (Feb 26th) – Antibody construction and generation

Week 9 (March 5th) - RNA interference & gene regulation in *C. elegans*; chemotaxis assay

Week 10 (March 12th) - Antibody applications - Westerns, gene knock-down, immunohistochemistry.

Week 11 (March 19th) - RNA technologies: Northern blot, RT-PCR, microarrays; Test #2 review

Week 12 (March 26th) – no lecture

Week 13 (April 2nd) – Test #2 in class

A more detailed weekly schedule is posted on Avenue2Learn.

Policy on missed work, extensions, late penalties and missed exams:

If you are absent from the university for a minor medical reason, lasting fewer than 3 days, you may report your absence, once per term, without documentation, using the McMaster Student Absence Form. Absences for a longer duration or for other reasons must be reported to your Faculty/Program office, with documentation, and relief from term work may not necessarily be granted. When using the MSAF, report your absence to Alison Cowie, email: cowieal@mcmaster.ca. You must then contact Alison Cowie immediately (normally within 2 working days of your return) to learn what relief may be granted for the work you have missed. If you miss a test you will write a make up test at a later date. If you miss

a lab it is not possible to run make up labs so normally, a missed lab will be completed using your partner's data. Please note that the MSAF may not be used for term work worth 25% or more, nor can it be used for the final examination.

Academic Integrity:

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process.

Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with at notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/ or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at

<http://www.mcmaster.ca/academicintegrity>

The following illustrates only three forms of academic dishonesty:

- a) Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- b) Improper collaboration in group work.
- c) Copying or using unauthorized aids in tests and examinations.

Academic Accommodation:

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Policy for [Academic Accommodation of Students with Disabilities](#).

Avenue to Learn

Avenue to Learn course pages are considered an extension of the classroom and usage is provided as a privilege subject to the same code of conduct expected in a lecture hall. This privilege allows participation in course discussion forums and access to supplementary course materials. Please be advised that all areas of Avenue to Learn, including discussion forums, are owned and operated by McMaster University. Any content or communications deemed inappropriate by the course instructor (or designated individual) may be removed at his/her discretion. Per the University Technology Services Code of Conduct, all members of the McMaster community are obligated to use computing resources in ways that are responsible, ethical and professional.

Final grades:

Grades obtained in Biology 3VV3 will be converted according to the following scheme, which is the one in general use at McMaster University. When the final marks are obtained, ALL borderline cases will be reviewed and, where warranted, adjustments will be made in the final mark.

90 – 100%	A+	12	70 – 72%	B-	7	53 – 56%	D	2
85 – 89%	A	11	67 – 69%	C+	6	50 – 52%	D-	1
80 – 84%	A-	10	63 – 66%	C	5	0 – 49%	F	0
77 – 79%	B+	9	60 – 62%	C-	4			
73 – 76%	B	8	57 – 59%	D+	3			