

Molecular Biology 3V03: Techniques in Molecular Biology
Fall Semester 2018/2019

Instructor: Dr. Danielle Sexton

Office hours: Mondays 10-11 am in TBD. I will also be available after most lectures, by email, and by appointment.

Email: sextondl@mcmaster.ca

Instructional Assistant: Alison Cowie

Office: LSB 119

Email: cowieal@mcmaster.ca

Lead TAs: Adrian Forsythe forsytae@mcmaster.ca

Xiafei Zhang zhanx56@mcmaster.ca

Assistant TAs: Rachel Andrews andrewrm@mcmaster.ca

Emma Mulholland mulholel@mcmaster.ca

Technical Coordinator: Julie Freund

Office: LSB 106

Email: freundzj@mcmaster.ca

Course objective: The goal of this course is for students to gain experience in performing diverse molecular genetic techniques, and hone their critical thinking and research skills.

Materials and Fees

Lab coat: \$26 from the Campus Store, if you do not already have one

Lab notebook: \$9.95 from Campus Store – will require ~50% of a notebook; can use an old notebook or use same notebook for a second course.

Course format: One lecture per week, held on Mondays (8:30-9:30 am in T13 Rm 105), where we will discuss the theory behind the up-coming labs, the techniques that will be used (along with alternative strategies that could be employed), and controls that will be important for experimental interpretation.

Two labs will be held every Tuesday and Thursday, from 2:30 pm – 5:30 pm in LSB 102 and LSB 103. Students will also be required to occasionally check on results outside of lab time.

Evaluation

15% Lab notebook

35% Lab reports (3)

15% Online activities/completion of case studies:

20% Final exam

15% Lab performance (competence, pre-lab quizzes, peer evaluation)

Lab notebook (15%)

It is critical that you take notes in the lab **while you are doing the work**. These notes should be written into a laboratory notebook as you do the work. They should contain:

- a sentence on the objective of the experiment
- the date when each experiment was performed (this can often be one of the most useful pieces of information in a lab notebook)
- reagents added (and volumes of each) for enzyme reactions/assays performed (e.g. PCR, restriction enzyme digestions, ligations, EMSAs)
- other technical numerical information such as incubation times (start, end, duration), temperatures, PCR programs, antibiotic concentrations in the plates, agarose gel percentages, etc.
- any modifications of the procedure or ways in which you deviated from the manual
- expectation of experimental outcomes (e.g. anticipated PCR product size)
- the results you obtained (in the form of the data as you actually obtained them), with everything very well labelled (e.g. what is shown in each lane of your gel picture?)
- a conclusion, stating what the experiment showed (and whether it matched what you predicted the outcome would be)

These sorts of notes are incredibly important when trying to troubleshoot experimental problems. Getting comfortable with this now will help you tremendously in future lab work (co-op terms, thesis positions, etc.). To encourage you to follow these recommendations, your lab notes will be signed at the end of each class by your TA, and will be evaluated twice during the term (once after the mid-term break, and once at the end of term). Lab notebooks will be submitted at the end of the labs. A sample page has been provided for you in the 'Helpful Information' section on Avenue.

Lab reports (35%)

There will be three full lab reports. The relative percentage associated with each of these may be subject to change.

- 10% 1st report covering Experiment 1A,B
- 10% 2nd report covering Experiment 1C,D
- 15% 3rd report covering Experiment 2

You can find more detail about the lab reports, and what is expected to go into them (along with excellent examples) in the 'Helpful Information' section of Avenue. Lab reports will be submitted in person to your TAs at the beginning of the labs.

Quizzes/activities/case studies (15%)

Many of the lecture classes will be associated with online quizzes on the theory behind the week's labs. These are intended to provide you with an opportunity to practice different skills (both technical and critical-thinking types), and to give me feedback on

areas where some additional discussion might be useful. Case studies will also be provided on a relatively regular basis, to help you work through some of the more challenging concepts. Online quizzes will be submitted online. Prelab quizzes will be handed out and submitted within the first 10 min of each lab to the TAs. Case studies will be submitted to your TAs during lab time.

Exam (20%)

The Final Written Exam will deal with both theory and practice of the material covered in the lectures and laboratory exercises.

Lab performance (15%)

This mark will encompass a number of different factors/components, including (but not limited to):

- performance on competence exercises
- performance on self-directed aspects of the labs
- lab citizenship (e.g. cleaning up after yourself)
- pre-lab quizzes/activities
- peer evaluation on your contribution to lab work

Laboratory Working Groups and Work Organization

For most experiments, you will be working in pairs. Everyone will be doing the same experiments each week; however, there will occasionally be choices for people to make regarding experimental direction, and consequently, experimental outcomes may differ. If an experiment does not work the first time, there may be time to repeat it; however, this will depend on both time and resource availability. Molecular biology/genetic-type experiments are by nature quite sophisticated, and as a result, total experimental failure is a real possibility. While we hope this isn't the case for any of you, we have back-up plans in place for everything, so no one/group will ever be left behind. It is expected that you and your partner will contribute equally to your experiments each class.

The labs are scheduled for two afternoons per week. You will occasionally need to come into the lab for brief periods of time outside of the two scheduled afternoons. We would please ask that if you are working as a group, that group members divide up this extra time equitably.

It is expected that you will have read over the material for each week's lab prior to the first lab of the week. You will be doing a short quiz (before the lab starts, and occasionally online) most weeks, focusing on topics/questions that are important for the up-coming week's labs. Any online activities will be due before the labs begin for the week.

Reading

While Techniques in Molecular Genetics (Mol Biol 3V03) is a laboratory course, both the techniques we use, and the questions we are addressing, are based on previous work by many groups. Reading up on the background of the techniques and experiments will help to ensure that you have a deeper understanding of what you are doing (and why),

and a better appreciation for where your experiments fit in the bigger picture.

To ensure that everyone is at the same level, there will be some assigned reading material – but you are encouraged to find additional sources at all stages! If you find an article or book chapter that you think is particularly helpful or interesting, please share it with us – and your colleagues!

Background reading should be completed before the submission of your lab reports, as this reading is meant to deepen your understanding of the field and place the work we are doing in the labs in larger context.

Attendance

Attendance to the labs is an essential part of your learning. As a result, attendance is required in the labs and is a component of the 'lab competence' grade. Attendance at the lectures is not required but is strongly encouraged!

Late Work, Missed Work, and Extensions

Late submissions will be penalized with a 10% per day deduction on the grade of the assignment. Students will be able to make up missed work following the guidelines under the Request for Relief for Missed Academic Work policy. Missed work cannot be made up without a valid MSAF or permission from the Faculty Office, as appropriate. Extensions may be given for medical or compassion reasons, or during extreme circumstances.

Academic Dishonesty

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 a 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 www.mcmaster.ca/academicintegrity. The following illustrates only three forms of academic dishonesty:

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

Academic Accommodation of Students with Disabilities

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. 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 Academic Accommodation of Students with Disabilities policy.

Requests for Relief for Missed Academic Term Work McMaster Student Absence Form (MSAF)

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work"

Academic Accommodation for Religious, Indigenous or Spiritual Observances (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email

Online Access and Work

In this course, we will be using email, Avenue to Learn, and additional web pages. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.