MICB 447- Experimental Research

Instructor:
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Assistant
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Class rooms
Computer access is available in room 138 Wesbrook. Lab work will be done in room 110, 112 and 114. Once your project is approved you may work in the lab rooms at most times between 9:00 and 5:00, Monday through Friday. Work should be planned so it is complete by 5:00.

There is a weekly classroom meeting in WOOD G42 each Thursday between 11:00 and 12:00. There will also be a scheduled individual, weekly meeting at room 136 with each student.

Purpose: The purpose of the course is to carry out a molecular biology research project in order to:

a. demonstrate your ability to apply your skills in this area of science
b. expand your background in this area of research
c. learn additional molecular biology skills

Learning Outcomes:

a. be able to define a research problem.
b. be able to examine a research problem and suggest reasonable experimental explanations and solutions
c. be able to locate information and background for designing an experimental protocol.
d. be able to critically evaluate experimental results
e. be able to maintain records and communicate results in a formal scientific presentation.
f. Be able to demonstrate a better understanding of the reality of practical molecular biology techniques and apply technical theory to the analysis of the observations.

Course Operation:
Each Thursday during scheduled class meeting we will discuss/review different aspects of project design and advanced molecular biology background such as nucleic acid isolation, restriction enzymes, hybridization and gel results. Towards the end of term we will also talk about the final report and the characteristics of the final report. The actual content of these classes will depend on general needs for the different projects in the class. Individual weekly meetings at other times will be scheduled to discuss details of individual projects with individual students or teams. By the start of your weekly meeting you should have an idea of the work that you are intending to complete in the following week and how you will do that work.

An original copy of your records must be maintained in a bound lab book or binder when you are working in the laboratory. This book must include all important laboratory details such as your working hypotheses, ideas, data, explanations of observations, and conclusions as well as significant discarded ideas, relevant references, equipment names and models, chemical sources and catalogue numbers. Once each week you must ask the instructor to sign the completed pages in the book. The first page of the book must be reserved for an index that is updated each week. Each page in the book must be numbered and dated as it is used so the important pages can be identified in the index.

The final report must be a formal journal article written in the style of the Experimental Journal of Microbiology and Immunology described in the JEMI file in the undergraduate folder of the

Microbiology and Immunology website www.microbiology.ubc.ca This style is adapted from the style used in the American Society for Microbiology journals such as J.Bacteriol and J.Immunol.

Grading

If students wish there can be a written final exam based on the concepts of experimental research. Otherwise the grading will be a subjective evaluation based:

a. On the demonstrated understanding of your attempted work and your demonstrated effort to achieve results. (Other research courses such as directed studies expect approximately 15 - to - 20 hours of lab work per week, your work - load should be similar).
b. Your progress.
c. On effective participation in the class discussions.
d. The written proposals and the completeness of the lab record book.
e. The project report (including the initial draft and the final report).
f. Lab etiquette (tidiness, consideration of others working in the lab, safety).
g. There is a penalty for late submissions of the initial draft or the final report unless permission for a late submission has already been arranged.

Tentative Schedule: (the schedule might be adjusted if the progress is too slow)

a. Sept 2, week 1 – select a problem and research background about the problem and the methods normally used to work with the problem. Sign-up for your project area.
b. Sept 8, week 2 – limit experimental problem, define the problem as an objective, start to develop an experimental plan, check sources of additional information, consider specific resource requirements (are the types of supplies and equipment available?), safety constraints. Start preparing general supplies that will be needed. Common supplies may be shared.
c. Sept 15, week 3 – refine experimental plan, justify the details and submit a written copy of the proposal to the course co-ordinator. Prepare specific supplies that will be needed to do the project. Common supplies may be shared. Request any chemicals or supplies that will likely be needed but are not available in the class inventory.
d. Sept 22, week 4 – begin experiments, report progress / problems / changes to proposals
e. Sept 29, Oct 6, 13, 20, 27, Nov 5, 10, 17, 24 – continue experimental work. Each week discuss progress of the results, observations and problems at the weekly individual meeting. Bring a printed copy of the results and experimental proposals to that meeting.
f. On Oct 22 at the end of week 8 prepare a report (about one or 2 pages long) that summarizes the results up to that time and outlines the remaining work to complete the project.
g. Nov 24, week 13 – continue work if necessary. Begin writing the introduction, methods and references for the final report. (Some of these details could be started sooner by writing them out as you encounter them in the project).
h. Nov 28. Provide an outline of the available results and general outline of the discussion. Clean up lab, stabilize useful cultures and supplies, and discard other materials.
i. If the initial draft is submitted by December 15th it will be reviewed and available to be picked up by later that week to do final revisions. If the initial report is submitted by January 12th it will be reviewed and available to be picked up by February 2nd to do final revisions.
j. Monday, February 16th – provide the final corrected report (paper copy and an electronic copy) and the lab record book for grading.

Books

Molecular Cloning, 2nd ed., J. Sambrook, E.F.Fritsch and T.Maniatis (1989)
Basic Methods in Molecular Biology, L.G.Davis, M.D.Dibner and J.F.Battey (1986)

Short Protocols in Molecular Biology, 4th ed., F.M.Ausubel, R.Brent, R.E.Kingston, D.D.Moore, J.G.Seidman, J.A.Smith, and K.Struhl (1999)
Practical in situ Hybridization, T.Schwartzacher and P.Heslop-Harrison (2000)
At the Bench ; a Laboratory Navigator, K.Barker (1998)
Successful Lab Reports, C.S.Lobban and M.Schefter (1992)

Catalogues
Promega (Fisher Scientific)
New England Biolabs
Fisher Biotech Collection
Bio-Rad Life Science Research Products
Invitrogen
Roche Molecular Biochemicals

Available Equipment
Electrophoresis chambers and power supplies (agarose and acrylamide); Electroporation apparatus; Fluorometer; Luminometer, High speed refrigerated centrifuges; Hybridization ovens; Incubators; Microfuges; Pipettors, PCR apparatus; Pulse-Field apparatus; UV capable spectrophotometers (with microcuvettes and standard cuvettes); UV chamber