



CIHR/MSFHR Strategic Training Program in

BIOINFORMATICS

Bioinformatics Student Research Rotations

Guidelines for Students and Supervisors

As part of the CIHR/MSFHR Strategic Training Program in Bioinformatics, students are required to spend at least three terms working in a laboratory under the academic supervision of a university faculty member. These are known as “research rotations”. Terms run for 4 months from September to December, January to April, and May to August.

1. **Timing**

The Program coordinator will ask all program faculty and associated faculty to prepare a bioinformatics-related research proposal that has the potential to lead to an MSc or PhD thesis project. The call for proposals is sent out two months before the proposed rotation is to begin. Participants are given four weeks to prepare a student research proposal that can be undertaken by a student in a four-month time period. The proposal should be academically-stimulating, and the student should be able to learn something and obtain meaningful results. Students are not to be considered as free laboratory labour and shall have a project with enough depth and scope that it reflects a graduate student’s level of ability. Receipt of all proposals will be expected no later than the date indicated by the program coordinator. Any proposals received after this date will not be circulated for student perusal. Potential supervisors should be aware that the ability of students and their time available for working on the project, due to course constraints, in their first two rotations (Sept – Dec and Jan – Apr) will be somewhat less than their ability in the third rotation (May - Aug) and their expectation of results should reflect this.

Potential supervisors should only take on rotation students if they are willing (and have the resources) to subsequently consider seriously the student as a thesis student in their own laboratory.

All proposals are collated and circulated to the relevant student cohort. Students will have three to four weeks to research and choose their rotation lab. During this time, it is expected that they will contact faculty members to discuss and determine their suitability for the rotation(s) of their choice. Students are required to submit their top three choices by the deadline indicated by the program coordinator.

All lists are coordinated and assessed for project suitability and over-lap. Students are assigned to a research rotation and further interviews with rotation scientists may take place, but are not necessary. Scientists are expected to make arrangements for working space, computers, etc. for the student. **Students cannot choose a rotation in the same supervisory lab that they have previously worked.* It is expected that students will have three different laboratories and supervisors, to maximize their exposure to different research milieus.

The first day of the rotation is the first day of the term. Students will make a formal presentation of their progress, approximately two-thirds through the rotation, to the program mentors, research supervisors and their lab staff, and the other bioinformatics student cohorts. This time frame provides enough time for the mentors to see that the student is getting adequate supervision for the rotation, is on the right track and not floundering, and has enough time left in the rotation to answer questions posed by mentors regarding the initial research. By taking on a rotation student, a supervisor also commits to attending this research presentation.

The format and content of a final rotation report will be at the discretion of the rotation supervisor. The student and supervisor are encouraged to discuss expectations for the report format early in the rotation. The report will be due on the last day of the rotation. Preparing the report, however, should not be an onerous task, as the student is preparing to go into the next rotation and must be able to start their research immediately and not be bogged down with report writing. For example, the report could also be considered to be a short user manual for any software created or simply the presentation of a well documented piece of software code.

2. **Research Proposal Process:**

- a) The scientist wishing to have a student on a research rotation in their laboratory prepares a description of a project and submits it to the program. **All associated faculty must have a program faculty* (bioinformatics.bcgsc.ca/mentors/index.html) as a co-supervisor, or their proposal will not be considered.
- b) The program circulates the project descriptions to the students and asks them to select a rotation project in which they are interested. The project description should be approximately one page and contain a description of the project, information about supervisor expectations, and desired outcomes. It may also contain further information about the supervisor and/or the lab. The more information you provide, the better the chances that students will be interested. A sample description has been attached for guidance.
- c) The program receives the students' choices and asks them to contact the supervisor to make arrangements to work in their lab. This may be done through an interview process. If the supervisor does not feel that the student is a good "fit" for their lab, for whatever reasons, the student has a second and third choice to fall back on. If more than one student requests the same rotation as their first choice, we ask that the supervisor interviews the students and makes the selection. One of the

programs rules requires that a supervisor cannot have more than one student in any one given term. All decisions must be approved by the program director (Dr. Steven Jones) and, potentially, other academic advisors to the program and/or the student's Admissions Committee.

- d) Once the selection has been made, the student works in the lab for the term. The lab is required to furnish the student with equipment (desk, computer, software). In academic laboratories, the student's stipend is paid by the program. It is important to note that students are essentially "full-time employees" of the lab in question, but have other responsibilities connected with the bioinformatics program. In the first and second research rotation terms (beginning in the September and January, respectively), students are required to take six graduate level courses required by the University. Similarly, the program requires students to attend other events connected with their education in bioinformatics, and the supervising scientist is asked to make this possible by allowing the student to leave the lab for such events.
- e) The student is required to make a presentation on the topic of his/her research approximately two-thirds of the way through the rotation period. We ask that the student's supervisor attend this presentation and other members of the lab are welcome.
- f) At the end of the rotation, the student should submit a report on the subject of his/her research within two weeks of the end of the rotation. As well, research work should be documented and archived in the individual laboratories where the rotation is carried out.

Research rotations are usually in academic laboratories but can also be in the private sector. When a rotation is undertaken in a private sector lab, an academic supervisor (holding a University appointment) shall be appointed to ensure that the work is of an appropriate scholarly level. The private sector laboratory must repay the program for the student's stipend (4 months x \$1500/month = \$6000). As well, a "confidentiality agreement" or non-disclosure agreement (NDA) must be in place before the student begins the rotation – this prevents problems when the student must make a presentation on his/her research. The program has a sample NDA available upon request.

If a student is nearing the end of his/her term with the bioinformatics program, has declared his/her academic goals (to complete a M.Sc., or transfer to a Ph.D. program) and made arrangements with an academic supervisor, it is possible for the student's final term in the program to be considered as part of their thesis research project and the time is spent in the laboratory of the student's prospective academic supervisor. The time is still to be considered a "rotation" and should be of a project length to be completed in 4 months. Once the rotation is finished, the student can continue the project as a larger MSc or PhD thesis. After August of the student's second year in the program, responsibility

for the student (including stipendiary arrangements) will transfer to the student's academic supervisor.

Sample rotation project description:

Title: Gene location and function in Eukaryotes

Lab: David Baillie, SFU, Molecular Biology and Biochemistry

Description:

The genomes of metazoans are packaged with histones. The histones can be (and are) covalently modified in any ways (methylation, acetylation, phosphorylation). There is a significant amount of evidence that these modifications alter availability of the genes to transcriptional control factors. If the areas of histone modification extend over DNA sequences greater than one gene, it is likely that these genes are being regulated in a co-ordinated manner. In some organisms (*Drosophila* and *C. elegans* most notably) there exists a reasonable body of expression data. In this project the student would examine methods for determining if genes that are contiguous in the genome show any indication of coupled regulation. This would involve developing tools to recover this information and present it in a pleasing fashion to "wet" lab researchers via a web site. The expression data used should come from SAGE or micro arrays.

Evaluation: A final report and a working program will be used to evaluate the project.