February 10, 2003

Professor Carolyn Tuohy
Vice-President, Policy Development
and Associate Provost
Room 206, Simcoe Hall
27 King's College Circle
University of Toronto

Dear Professor Tuohy:

At its meeting of January 28, 2003, the Council of the School of Graduate Studies approved the following motion:

> **THAT** SGS Council approve the proposal for a Collaborative Ph.D. Program in Proteomics and Bioinformatics, effective September 2003.

The motion, proposal, executive summary and memorandum of agreement are attached. All participating departments are within The Life Sciences, Division IV of SGS, and the proposal was approved at the January 14, 2003, meeting of the Division IV Executive Committee.

On behalf of the Council of the School of Graduate Studies, I am presenting this item to Governing Council committees, as appropriate, for information.

Yours sincerely,

Jane Alderdice
Secretary to SGS Council
and Coordinator of Policy, Program and Liaison

Encl.
/smr

c.c.	B. Andrews	U. deBoni.	T. Chan	J. Coleman	J. Lepock
	P. Lewis	S. Girard	A. Gotlieb	C. Johnston	R. Reithmeier
	O. Rotstein	L. Yee			

H:Council/FollowUp/2002-2003/Jan 28/Proteomics & Bioinformatics

Motion

School of Graduate Studies Council
Tuesday, January 28, 2003

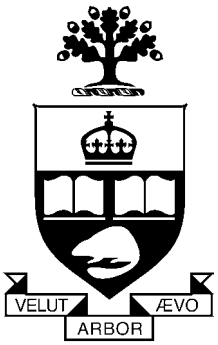
Item 7.2.

MOTION (/) **THAT** SGS Council approve the proposal for a Collaborative Ph.D. Program in Proteomics and Bioinformatics, effective September 2003.

See the proposal, executive summary and memorandum of agreement attached.

NOTE:
The Division IV Executive Committee at its meeting of January 14, 2003 approved this proposal.

With SGS Council's approval this item will go to Governing Council committees for information, and to the Ontario Council on Graduate Studies for a standard appraisal.



COLLABORATIVE PH.D. PROGRAM IN PROTEOMICS AND BIOINFORMATICS

Part I: Executive Summary

Part II: Program Proposal	Proposal to establish a Collaborative Ph.D. Program in Proteomics and Bioinformatics
Part IIIa: MoA on General Policies and Procedures	Agreement by the member departments on the objectives, policies, and procedures of the program
Part IIIb: MoA on Administrative Policies and Procedures	Agreement by the member departments on administrative issues
Part IV: Interim Regulations	Agreement by the member departments on interim regulations
Appendix Ia / Ib: Course Descriptions	Course descriptions
Appendix II: Traineeships	Scenario examples of collaborative traineeships
Appendix III: Faculty	Faculty Members and Descriptions of their Research
Appendix IV: Departmental Ph.D. requirements	Ph.D. program requirements of the participating departments

– Part I: Executive Summary –

The recent elucidation of the genomes of many organisms has lead to the appreciation that our knowledge of the function of the proteome is far from complete. A wide range of computational, theoretical, biochemical, structural, cell biological and genetic approaches need to cooperate to establish the connections between sequence, structure and function. Currently these approaches are relatively isolated and experts in one discipline are often uninformed in the others. The **Collaborative Ph.D. Program in Proteomics and Bioinformatics**, will address this with a coherent course of study that will educate and train doctoral graduate students across these diverse disciplines. We intend the program to serve as a model for a content-driven, trans-departmental unit that responds to the University's need to adapt to cutting-edge scientific developments.

Our academic program includes two new graduate courses with a hands-on, practical focus, the Proteomics and Bioinformatics seminar series, now in its third year, an annual workshop, and a requirement for traineeships in which students work on their projects with complementary technologies in a collaborating laboratory. It is our intent that students who graduate from the program will not only have been exposed to the key concepts of this emerging field, but have acquired technical skills that will allow them to pursue a transdisciplinary approach in their own future research. At the same time, the program will encourage a multitude of exploratory collaborations at the bench-level, thus greatly facilitating information flow and establishing a sense of coherence across the participants of the program.

The Faculty of Medicine and the Faculty of Arts and Sciences contribute to the program – the Departments of Biochemistry, Botany, Laboratory Medicine and Pathobiology, Medical Biophysics, Molecular and Medical Genetics, and the Institute of Medical Science are founding participants and other departments may join at a later date. Currently more than 30 faculty members of the participating departments have expressed their interest to participate in the program; accordingly we expect at least as many interested students. For course titles and contents and program faculty members, please refer to the appendices.

All participating host departments have fully approved and appraised graduate programs at the Ph.D. level. Each Department offers, or has offered recently, courses closely related to Proteomics and Functional Genomics. Thus, this new collaborative program represents a natural extension of existing programs in all host departments.

A Program Director and Program Committee will administer the program. The program will not require significant additional resources for its implementation.

Student members of the program will graduate from their home-departments and the designation "**Completed the Collaborative Program in Proteomics and Bioinformatics**" will be shown on their transcript.

– Part II: Program Proposal –

The recent elucidation of the genomes of many organisms has lead to the appreciation that our knowledge of the function of the proteome is far from complete. A wide range of computational, theoretical, biochemical, structural, cell biological and genetic approaches need to cooperate to establish the connections between sequence, structure and function. Currently these approaches are relatively isolated and experts in one discipline are often uninformed in the others. We have initiated a set of activities in this respect that revolve around a Collaborative Ph.D. Program in Proteomics and Bioinformatics, a coherent course of study that will educate and train doctoral graduate students across these diverse disciplines. This will be achieved by activities that include new graduate courses, the Proteomics and Bioinformatics seminar series, now in its third year, an annual workshop, and collaborative traineeships.

The Faculty of Medicine and its affiliated institutes have identified Proteomics and Bioinformatics as a priority research area. The University has recognized the importance of our initiative by awarding 10 tenure track faculty positions to support an academic program in Proteomics and Bioinformatics. The collaborative graduate program has the widespread support of scientists and the Chairs/Director of the six founding graduate departments (Biochemistry, Botany, Institute of Medical Science, Laboratory Medicine and Pathobiology, Medical Biophysics, and Molecular and Medical Genetics), as well as other academic units including the Banting and Best Department of Medical Research, the Department of Medicine, and the research institutes at the Hospital for Sick Children, The University Health Network, and the Mount Sinai Hospital. In this diverse environment, the Program's role is to provide a focus for academic and scientific activities, encourage and facilitate collaboration and the flow of information across research disciplines, and assist us in securing resources across departmental and institutional boundaries. In this respect we intend the program to serve as a model for a content-driven, trans-departmental unit that responds to the University's need to adapt to cutting-edge scientific developments.

The Program's participants will be the Departments of Biochemistry, Botany, Laboratory Medicine and Pathobiology, Medical Biophysics, Molecular and Medical Genetics, and the Institute of Medical Science. Currently more than 30 faculty members of the participating departments have expressed their interest to participate in the program; accordingly we expect at least as many student members.

All participating host departments have fully approved and appraised graduate programs at the Ph.D. level. Each Department offers, or has offered recently, courses closely related to Proteomics and Functional Genomics. Thus, this new collaborative program represents a natural extension of existing programs in all host departments.

The Program itself is defined through a Memorandum of Agreement between the participating departments that describes its binding principles and policies in Part III of this Document. A second Memorandum of Agreement on administrative details constitutes Part IV of this document.

Part IIIa: Collaborative Ph. D. Program in Proteomics and Bioinformatics
Memorandum of Agreement – General Policies and Procedures

The agreement between the Departments participating in a Collaborative Ph.D. Program in Proteomics and Bioinformatics, is outlined as follows:

To further graduate teaching and research in the field of proteomics and bioinformatics the undersigned departments have agreed to participate in a Collaborative Ph.D. Program in Proteomics and Bioinformatics (CPPB). This document describes the binding policies and procedures that define the program.

1. Objectives of the CP in Proteomics and Bioinformatics

1. **Train graduate students.** Doctoral graduate students in the areas of proteomics, functional genomics and bioinformatics will be exposed to concepts, strategies and methods from the research disciplines that contribute to the field. The program will place special emphasis on a collaborative, transdisciplinary approach.

2. **Attract new graduate students.** Excellent Canadian and international students choose their graduate schools according to the reputation of individual researchers and universities, funding level and available facilities. The CPPB will help to highlight the benefits of the Toronto campus in this respect and aim to establish the CPPB as synonymous of the highest standards of excellence of its members.

4. **Promote excellence in research and teaching in Proteomics and Bioinformatics.** The CPPB will facilitate information flow regarding cutting-edge developments to aid the strategic orientation of new and ongoing research projects. As well, it will help to coordinate lectures and courses, relevant for the program, across the departments.

5. **Provide a forum.** Interactions among students and investigators in Proteomics and Bioinformatics will be enhanced by means of participation in student seminars, student committees and research seminars. We will concentrate on activities that span departmental boundaries and improve the flow of information on all levels.

6. **Stimulate collaboration.** Shared technologies and interests are a foundation on which this program builds. Collaborative traineeships contribute to this at the level of individual researchers.

7. **Provide the nucleus for a growing research community.** A high profile of the Program will help to attract new faculty to our campus and stimulate the development of new projects in existing laboratories.

8. **Career Preparation:** Prepare students for attractive careers in academia and industry in a dynamic and highly transdisciplinary environment.

2. Student Membership

2.1. Eligibility

The CPPB is a Ph.D.-only program. The program strives to attract candidates with diverse backgrounds that may contribute to the field. Eligible students are involved in thesis research that has an essential component in the general area of proteomics, functional genomics or bioinformatics, and are supervised by a faculty member of the CPPB.

2.2. Application

Eligible students may apply to enter the CPPB before or after the transfer exam. Early application is recommended, to profit as early as possible from the CPPB courses. Applications are submitted directly to the Program Committee and include a CV and thesis proposal. Applications are reviewed by the Program Committee.

2.3. Admission Requirements

Students are admitted to the CPPB by the Program Committee on the basis of eligibility and review of the thesis proposal. Since the CPPB is a Ph.D.-only program, enrollment in the Ph.D. program of a participating department is a precondition for admission. The procedure for students who enter their Ph.D. program from a Masters degree is the same as that for students who enter after a transfer exam.

2.4. Program Requirements

To maintain their status as student members of the CPPB, students must be successful in all the elements of the collaborative program outlined below. Students who fail to fulfil these obligations will be excluded from the program by the Program Committee.

2.5. Graduation

Upon graduation of a student, the Program Committee determines whether the student has successfully participated in the CPPB and notifies the student's home department and the School of Graduate Studies accordingly. Subsequently, the designation "**Completed the Collaborative Program in Proteomics and Bioinformatics**" will be shown on the transcript.

3. Faculty Membership

All University of Toronto graduate faculty who are appointed in one of the participating departments are eligible as members of the CPPB. Faculty membership requires application to and approval by the CPPB Program Committee. Applications are reviewed on the basis of:

1. Evidence of an active research program that contributes to our knowledge of the function of the proteome.

2. Expertise and willingness to teach in one of the Ph.D. level courses in the CPPB as requested.
3. Commitment to attend the seminar series and participate in other activities of the CPPB, including involvement on graduate student supervisory committees.
4. Willingness to host students in their laboratory as part of their collaborative training within the CPPB.

Faculty membership is for a limited term of five years at which time faculty may apply for renewal.

Faculty members must obtain approval of their membership in the CPPB by the chair of their department.

Members of the Program Committee are automatically faculty members of the CPPB.

4. Academic Program

The academic program of the CPPB is coordinated and implemented by the Program Committee.

4.1. Core Courses

The CPPB offers two graduate courses (0.5 FCE each) with a hands-on, practical focus. Due to limited capacity, priority will be given to members of the CP in Proteomics and Bioinformatics and to students who have applied to the CPPB. Course enrollments have to be approved by the Program Director. It is expected that the courses be taken early in the student's program. The courses are taken in addition to the student's departmental Ph.D. course requirements in principle. However, these requirements may be satisfied in part by those of the CPPB, at the discretion of the respective home department (see Appendix IV).

The CPPB core courses are:
(1) JXX 20xxH (fall) Proteomics and Functional Genomics (see Appendix Ia)

(2) JXX 20xxH (spring) Applied Bioinformatics (see Appendix Ib)

4.2. Seminar Series

Student members must attend and participate in the Proteomics and Bioinformatics seminar series. In addition to providing an opportunity for students to discuss their research, this seminar series will provide a forum for faculty to interact and to learn about research projects in other laboratories. This seminar series will not substitute for a host department's seminar course but is attended in addition to all other course requirements.

4.3. Workshop

An annual workshop in Bioinformatics and Proteomics/Functional Genomics will be held in the late spring. Student members must present their research at the workshop.

4.4. Collaborative training

Students must spend an aggregate period of at least four months of their graduate studies in one or more collaborating laboratories of faculty members of the CPPB (see Appendix II). These collaborative traineeships are intended to provide special training in additional techniques and methods. Thus they are expected to be topically within the scope of the student's thesis and methodologically in the domain of expertise of the hosting laboratory. It is anticipated that each traineeship will be from one to three months in duration. The Program Committee makes available a list of training opportunities offered by the participating faculty members. Traineeships are organized jointly by the students and their supervisors and must be approved by the Program Committee, based on formal eligibility and the fulfilment of the objectives of the academic program. During the traineeship, students are jointly supervised by their supervisor and the hosting faculty member. After completion of each period of their traineeship, students report the details together with a brief summary to the Program Committee, which determines the credit to be applied towards the collaborative training requirements.

4.5. Supervision

Student members of the CPPB are expected to have a supervisory committee consisting of at least three members, which, in addition to the supervisor, must include at least one other faculty member of the CPPB.

4.6. Examination

The Ph.D. qualifying and thesis examinations committees will be constituted in accordance with the procedures of the home department and usually will include a faculty member of the CPPB in addition to the supervisor.

5. Director

The Director of the CPPB will be appointed for a three-year term (renewable) by the members of the Program Committee as representatives of the participating departments and in consultation with their chairs. Each candidate must receive approval from the home department for their name to be placed in nomination. The Chairs of the participating departments should approve the nomination. The appointment of the Director is made by the Dean of the School of Graduate Studies.

The Director of the Collaborative Program will submit an annual report to the School of Graduate Studies. It will outline the activities of the program over the past year, including the admission, enrollment and graduation of students. The Program Director will certify whether the students who have been brought forward for graduation have fulfilled the requirements of the Collaborative Program.

6. Program Committee

The CP in Proteomics and Bioinformatics is administered by the Program Committee, which includes one member from each of the participating departments, as well as the Director. The Director of the CPPB chairs the Program Committee.

All members of the Program Committee must themselves be faculty of the Program. Members of the individual departments will elect their own representatives to the Program Committee for a limited term.

The functions of the Program Committee include:

1. Approving student admissions to the CPPB
2. Approving faculty membership and renewal applications to the CPPB
3. Approving the CPPB academic program to ensure conformity with the goals and procedures of the participating departments
4. Evaluating the success of course offerings and communicating the results of the evaluation to the participating departments
5. Dealing with all other issues involving the administration of the program, CPPB policy and dissemination of information about the Program.

7. Student Representative

Student members of the CP in Proteomics and Bioinformatics will elect from their midst a representative for a one year term, subject to renewal. The role of the Student Representative is to focus student input on all aspects of the program except admissions, in close contact with the Program Committee.

8. Changes

Changes to the Policies above are proposed jointly by the Director and Program Committee and take effect after they have been approved by the participating departments and the appropriate committees of the School of Graduate Studies.

Part IIIb: Collaborative Ph. D. Program in Proteomics and Bioinformatics
Memorandum of Agreement – Administrative Policies and Procedures

9. Teaching Credits

Faculty members are credited for their teaching within the CPPB by their departments.

10. Participating Departments

A department or other academic unit of the University of Toronto is eligible to participate in the CP in Proteomics and Bioinformatics, if at least one application for membership from a faculty member of the department has been received by the Program Committee and that faculty member's application is reviewed positively. The School of Graduate Studies' approval is required.

A request to participate is made to the Director of the Program, who notifies the participating departments and the School of Graduate Studies.

An eligible department or other academic unit becomes a member of the CPPB once it enters into the agreement on general policies and procedures and the agreement on administrative policies and procedures of the CPPB.

A participating department may withdraw from the CPPB and its obligations after prior consultation with the Director and Program Committee.

11. Review

The CPPB will be subject to a periodic assessment with regard to overall performance and its role in graduate education, according to the SGS Guidelines on Collaborative Programs.

12. Contributions

Administrative support will be provided by the Program in Proteomics and Bioinformatics, which is funded centrally, for a minimum of five years. If needed, the costs for additional secretarial support for the program will be shared among the participating departments and other academic units, subject to a separate agreement.

13. Changes

Changes to the Policies above are proposed by the Director and Program Committee or any chair of a participating department and take effect after they have been agreed upon by the participating departments and approved by the appropriate committees of the School of Graduate Studies.

14. Signatures

Reinhart Reithmeier (Date)
Chair, Department of Biochemistry

Ori Rotstein (Date)
Chair, Institute of Medical Science

John Coleman (Date)
Chair, Department of Botany

James Lepock (Date)
Chair, Department of Medical Biophysics

Avrum Gotlieb (Date)
Chair, Department of Laboratory Medicine and Pathobiology

Brenda Andrews (Date)
Chair, Department of Molecular and Medical Genetics

Peter Lewis (Date)
Director, Program in Proteomics and Bioinformatics

Michael R. Marrus (Date)
Dean, School of Graduate Studies

Donald E. Cormack (Date)
Vice Dean, School of Graduate Studies

– Part IV: Interim Regulations –

The agreement between the undersigned Departments participating in a Collaborative Ph.D. Program in Proteomics and Bioinformatics, is outlined as follows:

While the Collaborative Ph.D. Program in Proteomics and Bioinformatics (CPPB) is being established, and until its proper organs have been constituted, the following interim regulations shall apply.

1. Interim Director and Steering Committee

The CPPB's Interim Director assumes all functions and responsibilities of the Program Director until the Program has been approved and the Director has been appointed. The Interim Director is

Boris Steipe	Department of Biochemistry

The Program's Steering Committee coordinates the submission of the proposal to SGS and assumes all functions and responsibilities of the Program Committee until the Program has been accredited and the Program Committee has constituted itself. It comprises

B. Steipe (Chair)	Department of Biochemistry
David Guttman	Department of Botany
York Pei	Institute of Medical Science
S. Der	Department of Laboratory Medicine and Pathobiology
G. Privé	Department of Medical Biophysics
A. Davidson	Department of Molecular and Medical Genetics

2. Review

The first review of the program will take place three years after the program's approval.

3. Signatures

Reinhart Reithmeier (Date)
Chair, Department of Biochemistry

Ori Rotstein (Date)
Chair, Institute of Medical Science

John Coleman (Date)
Chair, Department of Botany

James Lepock (Date)
Chair, Department of Medical Biophysics

Avrum Gotlieb (Date)
Chair, Department of Laboratory Medicine and Pathobiology

Brenda Andrews (Date)
Chair, Department of Molecular and Medical Genetics

Peter Lewis (Date)
Director, Program in Proteomics and Bioinformatics

Michael R. Marrus (Date)
Dean, School of Graduate Studies

Donald E. Cormack (Date)
Vice Dean, School of Graduate Studies

Collaborative Ph.D. Program in Proteomics and Bioinformatics

– Appendix I: Description of Core Courses –

JXX 20xxH (fall) Proteomics and Functional Genomics

Course outline, Draft V 0.1 Nov. 24, 2002

Course coordinator:

N.N
tel. .....
e-mail: .....@utoronto.ca

Summary

JXX 20xxH is a hands-on course that focuses on practical aspects of an interdisciplinary approach to proteomics and bioinformatics. It is offered within the academic component of the Collaborative Ph.D. Program in Proteomics and Bioinformatics (CPPB) and satisfies a part of the program's requirements. The course is designed to enable students to relate theoretical concepts to their own research and stimulate enhancements, based on the opportunities offered by the novel methods of proteomics and functional genomics. Alternatively - for those students whose thesis is in that field already - the discussion will center on the judicious choice of high-resolution methods.

The course will have a lecture component and a discussion component. Students will prepare lectures with required reading beforehand. In each lecture, an overview of practical aspects of a method of proteomics and functional genomics is given by a research scientist who is active in the field. In the discussion section that follows, potential applications to their own research topic will be proposed by the students and the feasibility and scientific merit will be discussed in a question and answer format.

Assignments will explore potential transdisciplinary approaches in the context of the student's own research. An initial set of three one-page project proposals are to be submitted in which the student will propose the exploration of specific aspects of her own research with modern methods of proteomics and functional genomics that are reviewed in the reading material. These proposals must be distinct from ongoing research in the laboratory. Three sets of student project proposals will be assigned to each student for critical review for the second assignment. The third assignment will formulate a rebuttal to the reviewers' arguments, together with improved proposals. For the final assignment, the student will choose - preferably jointly with his supervisor - one of the proposals for elaboration. The final proposal should be written so it could form the outline for a collaborative traineeship later in the student's program and include detailed methodology and protocols that would actually be available. Assignments will be graded by the course coordinator to ensure consistency.

This course satisfies one of two course requirements for the CPPB. As well, credit is applied towards the following Ph.D. program course requirements in the participating departments:

Department of Biochemistry	This course satisfies one of three half course requirements other than BCH2021.
Department of Botany	This course satisfies one of three half course requirements; at least one other half course has to be from BOT1700 series.
Department of Laboratory Medicine and Pathology	This course will be taken in addition to the departmental requirements.
Department of Medical Biophysics	MBP students are expected to fulfill the course requirements of both the CPPB and the Department of Medical Biophysics. However, it is anticipated that in most cases the courses required by the Program will serve to fulfill, in part, the Departmental requirements. When an exemption is obtained, this course can be counted for one half credit towards the Ph.D. requirements in MBP.
Institute of Medical Science	This course satisfies one-half of a full graduate course requirement.
Department of Molecular and Medical Genetics	This course can substitute for MMG 1016.

Classes will held in the Medical Sciences Building,, most probably Tuesdays from 10:00 - 12:00 A.M.

Limited enrollment

Due to the interactive nature of this course, the number of places is limited. All student members of the CPPB and eligible students who have applied to the program will be placed. Enrollment by other students as well as audition of this course requires approval by the Program Director.

Prerequisites

An introductory / advanced level 4th year undergraduate or graduate course in protein chemistry, molecular biology or functional genomics is a course prerequisite. The following courses of the academic year 2002-2003 can be applied towards this requirement:

BCH421H1	Protein Structure and Function
BCH440H1	Protein Biosynthesis
BOT1700H	Proteomics, protein complexes and signalling
MBP10008	Fundamentals in Cell and Molecular Biology

MGB420H1	Regulation of Gene Expression
MGB425H1	Cell Cycle Regulation
MGB452H2	Genetic Analysis of Development 2

Other courses can be approved by the course coordinator.

Course outline 2003:

Sept. 9	Introduction, organization, reading materials *First assignment (proposals) handed out*
Sept. 16	The transcriptome: microarray analysis
Sept. 23	2D gel electrophoresis
Sept. 30	MS-Analysis of post-translational modifications *First assignment due. Second assignment (review) handed out.*
Oct. 7	Yeast and mammalian 2 hybrid screens
Oct. 14	Yeast genetic interaction screens
Oct. 21	Genetic interaction screens in other organisms
Oct. 28	Immunoprecipitation and complex identification *Second assignment due. Third assignment (rebuttal and improvement) handed out.*
Nov. 4	High throughput Tap tagging
Nov. 11	Protein chips and beads
Nov. 18	Structural proteomics
Nov. 25	Large scale mutagenesis screens *Third assignment due. Last assignment (proposal) handed out.*
Dec. 3	High-throughput genotyping
Dec. 10	*Final assignment due*

Evaluation

Three research project sketches	20 %
Project sketch reviews	20 %
Project sketch review rebuttals	20 %
Research proposal based on project sketch	40 %

Collaborative Ph.D. Program in Proteomics and Bioinformatics

– Appendix I: Description of Core Courses –

JXX 20xxH (spring) Applied Bioinformatics

Course outline, Draft V 0.1 Nov. 24, 2002

Course coordinator:

Boris Steipe
tel. (416) 946-7741
e-mail: boris.steipe@utoronto.ca

Summary

JXX 20xxH is a hands-on course with a lab component that focuses on practical issues of bioinformatics in a post-genomic research environment. It is offered within the academic program of the Collaborative Ph.D. Program in Proteomics and Bioinformatics (CPPB) and satisfies a part of the program's requirements. The course is designed to address the disconnect between the genome-scale data that is available to life-science research in principle and the difficulties encountered when data analysis is to be systematically integrated into the experimental workflow in practice. At the root of this problem is the reliance on WWW-based interfaces that is antithetical to post-genomic science – characterized by the need to analyse not single genes in an *ad hoc* fashion, but whole genomes, single and across species, repeatedly, as databases grow, and filter, combine and analyze the results in creative, non-trivial ways. Fortunately, with the maturation of modern scripting languages such as Perl or Python, the entry barrier has come down to a level where it is feasible to empower a bench-scientist with the skills required to become productive with bioinformatics in the context of his own research

The course will have a lecture component and a lab component. Students will prepare lectures with required reading beforehand. In each lecture, an overview of a particular aspect is given with specific examples from practical bioinformatics and computational biology. Relevance to the wet-lab is our guiding principle. In the lab component students will set up and administer their own Linux workstation and learn how to use Perl to perform common bioinformatics tasks and combine them into meaningful analysis procedures.

Course assignments will explore the potential of bioinformatics approaches in the context of the student's own research. An initial set of three one-page project proposals will be submitted in which the student will propose how bioinformatics methods could support the exploration of specific aspects of her own research that would be new to the project. Three sets of student project proposals will be assigned for critical review for the second assignment. The third assignment will formulate a rebuttal to the reviewer's arguments together with improved

proposals. For the final assignment, the student will implement one of the proposed procedures - based on feasibility of the task with available modules and on scientific merit - as a prototype application.

This course satisfies one of two course requirements for the CPPB. As well, credit is applied towards the following Ph.D. program course requirements in the participating departments.

Department of Biochemistry	This course satisfies one of three half course requirements other than BCH2021.
Department of Botany	This course satisfies one of three half course requirements; at least one other half course has to be from BOT1700 series.
Department of Laboratory Medicine and Pathology	This course will be taken in addition to the departmental requirements.
Department of Medical Biophysics	MBP students are expected to fulfill the course requirements of both the CPPB and the Department of Medical Biophysics. However, it is anticipated that in most cases the courses required by the Program will serve to fulfill, in part, the Departmental requirements. When an exemption is obtained, this course can be counted for one half credit towards the Ph.D. requirements in MBP.
Institute of Medical Science	This course satisfies one-half of a full graduate course requirement.
Department of Molecular and Medical Genetics	This course can substitute for MMG 1016.

Classes will be held in the Medical Sciences Building, most probably Tuesdays from 10:00 - 11:00 A.M. Labs are expected to be held in the Computer Teaching Lab, of the Medical Sciences Building. Likely dates are Tuesdays and Thursdays from 16:00 - 18:00.

Limited enrollment

Due to the interactive nature of this course and the lab component, the number of places in this course is limited. All student members of the CPPB and eligible students who have applied to the program will be placed. Enrolment by other students as well as audition of this course requires approval by the Program Director.

Prerequisites

This course does not require programming skills; it is designed to allow any student member of the CPPB to participate successfully.

Students may use their own laboratory computer for the lab if they wish. This will allow them to leave the course with an installed and configured Linux bioinformatics workstation they can use subsequently. Suggested hardware will be discussed briefly in the organizational meeting; we anticipate being able to negotiate a package price for this course.

An introductory level 4th year undergraduate or graduate course in bioinformatics or computational biology is a course prerequisite. The following courses of the academic year 2002-2003 can be applied towards this requirement:

BCH441H1	Bioinformatics
BIO472H1 / JBZ 1473H	Computational Genomics and Bioinformatics
MBP1011H	Foundations of Bioinformatics

Other courses can be approved by the course coordinator.

Course outline 2004:

Jan. 13	Introduction, organization, hardware, reading materials *First assignment (proposals) handed out*
Jan. 20	Installing Linux, basic system maintenance
Jan. 27	Perl I - the basics
Feb. 3	Data to information: Intelligent strategies for bioinformatics *First assignment due. Second assignment (review) handed out.*
Feb. 10	Installing bioinformatics tools
Feb. 17	(No class - Reading Week)
Feb. 24	Fundamentals of datastructures and algorithms
Mar. 2	Perl II - use of datastructures *Second assignment due. Third assignment (rebuttal and improvement) handed out.*
Mar. 9	Accessing public databases
Mar. 16	Perl III - using modules
Mar. 23	Fundamentals of software engineering *Third assignment due. Last assignment (project) handed out*
Mar. 30	Perl IV - Bioperl
Apr. 6	Combining procedures into processes
Apr. 20	*Final assignment due*

Evaluation

Three research project sketches	20 %
Project sketch reviews	20 %
Project sketch review rebuttals	20 %
Working prototype based on project sketch	40 %

Collaborative Ph.D. Program in Proteomics and Bioinformatics

– Appendix II: Collaborative Traineeship Scenarios –

These scenarios are provided to illustrate the combination of contents and methods the program encourages. All details of actual traineeships will be decided by the collaborating supervisors; in addition the traineeships require approval by the Program Committee.

Home Laboratory Topic	**Host Laboratory Method**	**Traineeship objective**
Signalling pathways	Genetic interactions	Find genetic interactions for one critical component of pathway currently under study to generate hypothesis about functional redundancies in convergent pathways.
Development	Structural genomics	Attempt definition of domains and separate expression of domains from large, multidomain protein of interest, to delineate multiple, distinct functions.
Genetic predisposition to disease	Bioinformatics - Databases	Attempt *in silico* reconstruction of pathways involving gene(s) of interest from interaction information.
Inherited disease	Tap tags	Define participation of gene of interest in molecular complex as a prerequisite to generate hypotheses about pathomechanism.
Statistical models	Microarrays	Define a biologically meaningful analysis strategy based on current methods in statistical modelling to allow automatic analysis of microarray time series; define experimental requirements.

Collaborative Ph.D. Program in Proteomics and Bioinformatics

– Appendix III: Faculty Members and Descriptions of their Research –

The following individuals have applied to become faculty members of the Collaborative Ph.D. Program in Proteomics and Bioinformatics. They have agreed to the Principles and Policies of the Program and their membership has been approved by the Steering Committee.

1. Biochemistry

Grant W. Brown

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Julie D Forman-Kay

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Emil F. Pai

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Boris Steipe

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2. Botany

Dinesh Christendat

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3. Institute of Medical Science

York Pei

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Katherine Siminovitch

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4. Laboratory Medicine and Pathobiology

Joan M. Boggs

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5. Medical Biophysics

Cheryl Arrowsmith

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6. Molecular and Medical Genetics

Brenda Andrews

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Ben Blencowe

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Jack Greenblatt

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Collaborative Ph.D. Program in Proteomics and Bioinformatics

– Appendix IV: Summmary of CPPB course credits within the Ph.D. program requirements of the participating departments –

Department of Biochemistry:

Each CPPB course can substitute for one of three required half courses other than BCH2021.

Department of Botany:

A minimum formal course requirement of 3 half courses must be fulfilled, with the first half course taken in the student's first year. One of the half courses should be from the BOT1700 series. The CPPB courses may fulfill the requirement for 2 of the 3 half courses.

Department of Laboratory Medicine and Pathology

CPPB courses will be taken in addition to the departmental requirements.

Department of Medical Biophysics:

MBP students are expected to fulfill the course requirements of both the CPPB and the Department of Medical Biophysics. However, it is anticipated that in most cases the courses required by the Program will serve to fulfill, in part, the Departmental requirements. For example, when an exemption is obtained for one or more required MBP courses, either or both CPPB courses can be counted for one half credit each towards the Ph.D. requirements in MBP.

Institute of Medical Science:

The minimum course requirement for the PhD degree in the IMS is the equivalent of one full graduate course, in addition to MSC 1011Y Student Seminars. Both CPPB courses can count for one-half credit towards this requirement.

Department of Molecular and Medical Genetics:

Either CPPB course can substitute for MMG 1016.