

SIMON FRASER UNIVERSITY

OFFICE OF THE VICE-PRESIDENT, ACADEMIC

MEMORANDUM

To: Senate

From: J. M. Munro, Chair
Senate Committee on Academic Planning

Subject: Proposed MBB Graduate Program

Date: February 13, 1995

Action undertaken by the Senate Graduate Studies Committee and the Senate Committee on Academic Planning gives rise to the following motion:

"That Senate approve and recommend approval to the Board of Governors as set forth in S.95 - 18 , the proposed graduate program in Molecular Biology and Biochemistry including:

New courses:

MBB 801 - 2	Student Seminar in Molecular Biology and Biochemistry I
MBB 802 - 2	Seminar in Molecular Biology and Biochemistry II
MBB 806 - 3	Ph.D. Graduate Research Seminar
MBB 811 - 1	Techniques in Molecular Biology and Biochemistry
MBB 812 - 2	Techniques in Molecular Biology and Biochemistry
MBB 813 - 3	Techniques in Molecular Biology and Biochemistry
MBB 821 - 3	Nucleic Acids
MBB 822 -3	Biological Membranes
MBB 823 - 3	Protein Structure and Function
MBB 824 - 3	Physical Biochemistry
MBB 825 - 3	Bioenergetics
MBB 826 - 3	Molecular Immunology
MBB 827 - 3	Mechanisms in Enzyme Catalysis
MBB 828 - 3	Spectroscopic Methods in Biochemistry
MBB 829 - 3	Special Topics in Biochemistry
MBB 831 - 3	Molecular Evolution of Eukaryote Genomes

MBB 832 - 3 Molecular Phylogeny and Evolution
MBB 833 - 3 Developmental Genetics
MBB 834 - 4 Topics in Developmental Biology
MBB 835 - 3 Genome Analysis
MBB 836 - 3 Gene Expression
MBB 837 - 3 Molecular Genetics of Signal Transduction
MBB 839 - 3 Special Topics in Molecular Biology
MBB 871 - 1 Directed Readings in Molecular Biology and Biochemistry
MBB 872 - 2 Directed Readings in Molecular Biology and Biochemistry
MBB 873 - 3 Directed Readings in Molecular Biology and Biochemistry

Deletion of:

CHEM 823 - 3

CHEM 825 - 3

BISC 881 - 3

Selected Topics of Special Biochemical Interest
Bioenergetics
Special Topics in Cell and Molecular Biology."

* Chem 824-3

J. M. Mauro

* Secretary's note: The course Chem 824 should be added to the list of courses to be deleted; it has been replaced by MBB 828.

Agreement has been reached between the Faculty of Science and the Library in the assessment of library costs associated with the new courses

SIMON FRASER UNIVERSITY
OFFICE OF THE DEAN OF GRADUATE STUDIES

Memorandum

TO: Senate Graduate Studies Committee

FROM: Bruce P. Clayman
Dean of Graduate Studies

SUBJECT: MBB Graduate Program

DATE: December 23, 1994

This is to provide clarification of the nature and status of the Molecular Biology and Biochemistry (MBB) Graduate Program proposed by the Faculty of Science. As you will note from page 2 of the letter from Dean Colin Jones dated June 23, 1994, this program is **not** really a new degree program.

It is essentially a set of MBB graduate courses and MBB degree requirements, expressed in terms of those courses; there is an MBB steering committee that guides the program and makes recommendations to the departmental Graduate Program Committees in Biological Sciences and Chemistry. All students are enrolled in one of those two departments and receive their M.Sc. or Ph.D. degrees from Senate upon recommendation from that department. Graduate degree parchments do not specify the area of concentration and thus will simply confer an M.Sc. or Ph.D. The MBB courses are creatures of both departments and therefore new and revised courses require the approval of both departments as well as that of the Faculty of Science.

I note that **implicit** in this proposal is the deletion of CHEM 823 and 825 and BISC 881. Any motion for approval should include this explicitly.

I view this as an interesting and positive example of inter-departmental cooperation and collaboration in an area of common interest. I recommend approval by the SGSC in the hope that implementation in fall 95-3 will be possible.



c. P.M. Wrenn
B. Brandhorst
C.H.W. Jones

**PROPOSAL FOR M,SC. & PHD IN
MOLECULAR BIOLOGY & BIOCHEMISTRY**

- | | |
|-------------|--|
| Nov 1992 | Approved "in-Principal" by Senate Committee on Academic Planning |
| 23 Jun 1994 | Approved by Faculty of Science Graduate Studies Committee |
| 11 Jul 1994 | Received by the Dean of Graduate Studies |
| 06 Dec 1994 | Reviewed by Assessment Committee for New Graduate Programs |
| 09 Jan 1995 | Reviewed by Senate Graduate Studies Committee |

SIMON FRASER UNIVERSITY

DEAN OF GRADUATE STUDIES

Memorandum

TO: B. P. Clayman
Chair
Senate Graduate Studies Committee

FROM: Phyllis M. Wrenn
Associate Dean
Chair, ACNGP

SUBJECT: MSc & PhD in Molecular Biology
& Biochemistry

DATE: December 20, 1994

The Assessment Committee for New Graduate Programs (ACNGP) has approved and recommends to the SGSC for approval a proposal for an **MSc and a PhD in Molecular Biology & Biochemistry**. The first draft of the proposal was received on 23 June 1994. The ACNGP decided to recommend approval of the programs without requiring an external review. The ACNGP noted that these programs, offered jointly by the Departments of Chemistry and of Biological Sciences, will be included in the next External Review of the Department of Biological Sciences.

Please place this proposal on the agenda of the January 9, 1995 meeting of the SGSC. By copy of this memo, I am inviting B. Brandhorst to attend this meeting as a representative of the proposed programs.

Phyllis M. Wrenn

Encl.

c: B. Brandhorst
C. Jones
M. McGinn

SIMON FRASER UNIVERSITY

DEAN OF GRADUATE STUDIES

Memorandum

TO: B. Brandhorst
IMBB

FROM: Phyllis M. Wrenn, Associate
Dean of Graduate Studies,
Chair, ACNGP

SUBJECT: MSc and PhD in Molecular Biology
& Biochemistry

DATE: December 16, 1994

I am pleased to confirm that the Assessment Committee for New Graduate Programs (ACNGP) voted to recommend that the proposal for an MSc and PhD in Molecular Biology and Biochemistry be forwarded to the Senate Graduate Studies Committee, subject to the following changes, to be completed to the satisfaction of the Chair of the ACNGP (myself).

1. The proposal should be revised to eliminate apparent duplication (clearly differentiating **calendar entry** from descriptive proposal), and to clarify the history of previous offerings (as Special Topics) of courses included in the proposal, in order to make clear what is new and what is not.
2. A timing matrix - projection of course offerings / staffing (4 - 6 years) should be included, and related to previous offerings.
3. Course outlines should be revised as required to include a specific statement of faculty competence (example BISC831, etc.).
4. A covering statement pointing out the relevance of the format of the Library review to the bibliographic format/aims of the proposed courses would be useful.

I look forward to receiving your revised proposal as soon as the changes requested are complete, and will forward it for inclusion on the agenda of the next meeting of SGSC, as soon as possible.

Phyllis M. Wrenn

SIMON FRASER UNIVERSITY
MEMORANDUM

JUL 11 1994
DEAN OF GRADUATE
STUDIES OFFICE

To: B.P. Clayman, Dean
Graduate Studies

From: C.H.W. Jones, Dean
Faculty of Science

Subject: **MBB Graduate Programme** Date: June 23, 1994

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I am pleased to forward to you a proposal for the establishment of a graduate programme in Molecular Biology and Biochemistry which will be offered by both the Departments of Biological Sciences and of Chemistry as a stream within the graduate programmes of those two Departments.

The Context

The Institute of Molecular Biology and Biochemistry was established in the summer of 1987 to "...enhance and promote basic research in molecular biology and biochemistry and to coordinate graduate education in those disciplines." The Funds for Excellence in Education Programme provided funding which allowed the establishment of six new faculty positions in this area (Drs. Brandhorst, Price, Boone, Borgford, Sen and Scott), and these appointments were made within the Departments of Biological Sciences and Chemistry. These positions were in addition to those faculty in Biological Sciences and Chemistry already in the areas of Molecular Biology and Biochemistry (Drs. Honda, Smith, Baillie, Beckenbach, Cushley, Richards and Cornell). On the basis of this developing new initiative, the University was successful in securing funding for a new building (the South Science Building) which would accommodate the graduate teaching and research programmes of the Institute, as well as providing additional research and undergraduate teaching space for the Departments of Biological Sciences and Chemistry. Construction of this building was completed in May 1993 and the building was formally opened in November 1993.

With the arrival of the new faculty in the Institute, the need for a clearly defined graduate programme in molecular biology and biochemistry quickly became apparent. In June 1992 the IMBB brought forward a Statement of Intent for the establishment of a new, independent graduate programme and this was forwarded to the Departments of Biological Sciences and Chemistry for their input. In October 1992 the Faculty of Science voted to approve the Statement of Intent, and it was then forwarded to the Senate Committee on Academic Planning, which approved it in November 1992. The detailed planning of the new graduate programme proposal then began.

The Graduate Programme in Molecular Biology and Biochemistry

While the original intent was for the programme to be quite independent, discussions with Biological Sciences and with Chemistry during Fall 93 and Spring 94 led to the conclusion that a graduate Molecular Biology and Biochemistry programme

that would be offered both within Biological Sciences and within Chemistry would best suit the needs of the students in the programme and of the parent Departments.

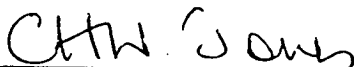
The key features of the proposal are:

1. A new programme of MBB courses is established which will service MBB graduate students in both Biological Sciences and Chemistry and will be offered by these two departments under the aegis of their degree programmes;
2. The requirements for the M.Sc. and Ph.D. degree programmes are specified in terms of these MBB courses;
3. Graduate applications in the area of Molecular Biology and Biochemistry will be screened for admission by the MBB Steering Committee and will be recommended to the appropriate Departmental Graduate Studies Committee for admission into that Department;
4. Graduate supervisory committees and thesis examining committees will be ratified by the Department GSC's on the recommendation of the MBB Graduate Programme Committee;
5. The MBB GPC will make recommendations on students eligible for Fellowships and Scholarships to the appropriate Department GSC for consideration along with other graduate students in that Department;
6. The MBB graduate students will enjoy all the benefits and privileges of being a student of their home Department;

This proposal has been approved independently by the Departments of Biological Sciences and Chemistry and by the Faculty of Science as a whole (May 26, 1994).

Recommendation

That the proposal for a new graduate programme in Molecular Biology and Biochemistry within the Departments of Biological Sciences and Chemistry be presented to the Senate Graduate Studies Committee for their consideration and approval.


C.H.W. Jones

CHWJ:ln

c: B.P. Brandhorst
B.A. McKeown
A.C. Oehlschlager
S. Thomason

To: Dr. Colin Jones
Dean, Faculty of Science

From: Dr. Bruce Brandhorst
Director, IMBB

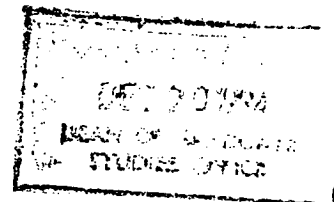
BK

Budgetary implications of implementation of the Graduate Program in Molecular Biology and Biochemistry June 8, 1994

I have outlined below the budgetary implications that I foresee of creating a Graduate Program in Molecular Biology and Biochemistry as streams of graduate programs in the Departments of Chemistry and Biological Sciences:

1. Faculty staffing. The Institute of Molecular Biology and Biochemistry (IMBB) was founded in 1987 to promote graduate training and research. The establishment of a graduate program in molecular biology and biochemistry was anticipated at the time. Since then an allocation of Funds for Excellence in Education (FEE) has resulted in the hiring of 6 new faculty members as well as administrative and secretarial support staff. The 13 faculty members of IMBB will be able to mount the proposed graduate program of 10-12 courses per year while continuing their balanced and reasonable commitment to undergraduate teaching programs in Biochemistry and Biosciences. However, it will be essential that teaching replacement funds be provided for faculty who are unavailable to teach e.g. because of sabbaticals or leaves. A replacement for the vacant position in Biochemistry eliminated in recent (92-93) budget cuts will be sought.
2. Library collection: The proposals for new courses for the program included a list of books and journals which are desirable, though not essential, for the proposed program. These include some books and serials already identified as essential for courses in the undergraduate programs, but not yet acquired by the library. Most of the serials listed have high impact ratings and have been requested by several faculty members (mostly new recruits); they would be important additions to the research collection of the library. Ralph Stanton at the Library has estimated that the one time cost for books is \$388 and the recurring cost to acquire all serials is \$3,517 per year. I would prefer to see these serials acquired through adoption of an appropriate user-based assessment mechanism designed to allow the collection to evolve to meet the changing needs of its users. However, uncommitted FEE funds could be used for the library acquisitions, as you have proposed.
3. Office staff: There will be a requirement for some secretarial help with the processing of inquiries and applications to the program, which the IMBB will be handling. We also anticipate tracking the progress of our students (currently 42) through the program. There will be no immediate increase in the number of graduate students in Departmental programs and only modest increases are anticipated over the next few years. It may thus be possible for the Departments of Chemistry and/or Biological Sciences to provide this secretarial support.. Alternatively, uncommitted FEE funds could be used to create a part-time position of graduate secretary, as you have proposed.

To: Dr. Phyllis Wrenn
Associate Dean, Graduate Studies



From: Bruce Brandhorst
Director, Institute of Molecular Biology and Biochemistry

Re: Proposal for the Graduate Program in Molecular Biology
and Biochemistry.

A revised set of documentation is attached. It includes:

1. "Proposal for a Graduate Program in MBB" written in the format of the University President's Committee form for new programs. It includes a description of the proposed program, complete with history, justification, documentation of the need for the program and projected enrollments, organization of the program, and financial considerations. The proposed "Organization of the program" is derived *verbatim* from the original "Proposal" document approved by the Faculty of Science; this document has now been deleted to avoid confusion with the "Calendar Entry" document.
2. Appendix 1. The proposed "Calendar Entry", describing the admission and degree requirements, as well as the courses to be offered. The course descriptions have been shortened in several instances.
3. Appendix 2. This is a summary of the relationship of proposed courses to existing CHEM and BISC courses. In addition, a tentative 4 year cycle of MBB graduate course offerings is included (starting in 95-3).
4. Appendix 3. A discussion of the budgetary implications with respect to library acquisitions, which have become negligible. It refers to Ralph Stanton's report, but I have not included his report. We currently regard the library resources to be adequate to mount the proposed courses, which should not be surprising since most courses have previously been offered in the past three years.
5. Descriptions of each of the proposed MBB courses. In many instances these have been revised to provide ample indication of the competence of the instructor (where applicable) and a consideration of the library resources, which we currently regard as adequate. The "justification" sections have been expanded in some instances.

I have not included other documentation from the Dean of Science, Colin Jones.

I hope these modified documents will facilitate the next steps in the consideration of this program. Please contact me at any time if more information is required.

Proposal for a Graduate Program in Molecular Biology and Biochemistry at Simon Fraser University

I. General Information:

Title: Graduate Program in Molecular Biology and Biochemistry.

Credentials to be awarded to Graduates: M.Sc. and Ph.D.

This interdepartmental program will be administered by a Steering Committee consisting of Members of the Institute of Molecular Biology and Biochemistry (IMBB), who are drawn from the Departments of Biological Sciences and Chemistry of the Faculty of Science. In addition, Associate Members drawn from these Departments as well as from other Departments and Faculties (e.g., Kinesiology, Applied Sciences) may participate in the program. The MBB Graduate Program will operate as two parallel streams in the graduate programs of the Departments of Chemistry and Biological Sciences.

Date of Senate Approval: ?

A Statement of Intent (submitted in June, 1992) has been approved by the Faculty of Science (Oct. 5, 1992) and SCAP (Nov. 4, 1992). The proposed program has been approved by the Departments of Chemistry and Biological Sciences, and by the Faculty of Science (May 26, 1994).

Projected starting date: September, 1995.

II. Program Description and Related Matters.

Objectives of the Program

The objective of the proposed program is to provide advanced education at the graduate level in research methods and state of knowledge of molecular biology and biochemistry. The program will emphasize training in basic research, but the knowledge and experience gained will be useful for more applied research problems.

Relationship to the Role and Mission of SFU

The role and mission of the University is to educate students and discover important new knowledge concerning the natural world and the human experience. Graduate education in the sciences is a research apprenticeship which should focus on the frontier areas in which important new knowledge is rapidly generated. Molecular biology is the vanguard of the revolution in the biological sciences and has been at the forefront of biomedical research for over two decades. Biochemists now rely on the methods of molecular biology (viz cloning, sequencing, and manipulation of genes and their protein products) as an essential component of their research on the structure, function, and regulation of activities of macromolecules. The methods of molecular biology are now being applied to all the traditional disciplines of the life sciences, offering opportunities for important new advances. The IMBB includes members having a range of

interests in biochemistry and biology who all rely on applications of the methods of molecular biology.

History and purpose of the IMBB

The interdepartmental Institute of Molecular Biology and Biochemistry (IMBB) was founded by SFU in 1987 to promote basic research in these disciplines and to coordinate graduate education. The establishment of the MBB Graduate Program is a fulfillment of the graduate education component of that mandate. Members of the IMBB currently train graduate students through graduate programs in their respective departments of Chemistry and Biological Sciences. These departments have substantially different degree requirements and focus on traditional disciplines. Formal graduate course offerings in molecular biology and biochemistry have been irregular, infrequent, and unintegrated. The establishment of the MBB Graduate Program will allow the implementation of a rational and integrated training program more appropriately designed for its students. The Director of the IMBB, as Chair of the Graduate Program Committee, will be responsible for the planning and implementation courses in the MBB Graduate Program. Scheduling of MBB courses will be through regular consultation involving the Director of IMBB, the Chair of the interdepartmental Biochemistry Curriculum Committee, and representatives of the Departments of Biological Sciences and Chemistry. The Dean of Science will supervise this consultative process.

The IMBB initially included 6 founding members, too few to offer a coherent graduate program. Six new members, including a Director, were externally recruited using an allocation of Funds for Excellence in Education. Two members were recruited internally and one resigned. Currently there are 13 members. In addition, there are 10 Associate and 2 Affiliate members holding appointments in the Departments of Biological Sciences, Chemistry, and Kinesiology. Students of Associate members may be accepted into the program.

Relationship to other graduate programs in British Columbia

Somewhat similar programs in B.C. are offered by the Department of Biochemistry and Microbiology at U. Victoria and the Department of Microbiology at UBC. These Departments are oriented toward applications of molecular biology and biochemistry to microbes and viruses, as well as some problems of immunology. The recently renamed UBC Department of Biochemistry and Molecular Biology is mainly focused on traditional problems of human medical biochemistry, though the techniques of molecular biology are frequently used. The proposed MBB program is unique in that it focuses on the application of molecular biological and biochemical methods to a range of basic research problems concerning a broad variety of eukaryotic organisms. The interdepartmental Genetics Graduate Program at UBC is similar in design to the proposed MBB Graduate Program, but concentrates on traditional genetics.

The IMBB has focused its research efforts on developmental and molecular genetics, molecular evolution and phylogeny, cellular signalling, and macromolecular structure, recognition, and function. The research tends to take an interdisciplinary approach and the MBB Graduate Program

will emphasize this. In terms of research interests and focus, the MBB Graduate Program is distinct from other programs of B.C. Universities.

Organization of the program

(As approved by the Faculty of Science, May 26, 1994)

The interdepartmental MBB Graduate Program is administered by a Steering Committee consisting of members of the Institute of Molecular Biology and Biochemistry (IMBB), and chaired by the Director, IMBB. Members of the IMBB have appointments in the Departments of Biological Sciences or Chemistry. In addition, the IMBB has Associate Members from these and other departments who may participate in offering the graduate program, including serving as Senior Supervisors (or Co-Supervisor in the case of Associate Members not in the Departments of Biological Sciences or Chemistry).

A student in the MBB program is defined as a student whose Senior Supervisor is a Member or Associate Member of the IMBB and who has been admitted to the MBB Graduate Program.

The MBB Graduate Program Committee (GPC) is elected by the MBB Steering Committee and coordinates operation of the MBB Graduate Program. It reviews and selects applicants recommended for admission, ranks MBB students for scholarships and fellowships, recommends the appointment of Supervisory Committees, monitors progress of students in the program, and recommends Thesis Defense Committees in accordance with SFU General Graduate Regulations.

The Graduate Supervisory Committee of each student will consist of the Senior Supervisor and at least two other members recommended to the GPC by the Senior Supervisor in consultation with the Student. At least one member of the Supervisory Committee must be a member of the MBB Steering Committee.

Students recommended for admission to the MBB Graduate Program must also be admitted to the Graduate Program of the department of the Senior Supervisor. The Departmental Graduate Studies Committee of that Department will review and ratify the recommended Graduate Supervisory and Thesis Defense Committees of each MBB student. The ranked list of MBB students applying for SFU Graduate Fellowships and other scholarships will be submitted to the appropriate Departmental Committee for consideration with other departmental candidates. A member of the Chemistry Graduate Studies Committee will be selected by mutual consent of the MBB Steering Committee and the Department of Chemistry.

Curriculum and degree requirements of the program

(Approved by the Faculty of Science, May 26, 1994)

Students in the MBB Graduate Program will meet its admission and degree requirements. The curriculum and requirements of the MBB graduate program, including a list of faculty and their research interests, is attached as a proposed Calendar entry as Appendix 1.

Several of the proposed graduate course offerings already exist as courses in Chemistry and Biological Sciences. These would be replaced with MBB courses, but would continue to serve interested graduate students in those Departments. Most of the other proposed courses have been offered in recent years as Special Topics courses in Chemistry or Biological Sciences and will now be formalized. Some are new courses, to be offered by newly recruited faculty or in response to need and opportunity. A tentative 4 year schedule of MBB courses and an outline of the relationship of new courses to existing courses is included as Appendix 2.

III. Need for the program.

Importance of the Disciplines

Many of the important recent advances in biomedical research and their application to clinical practice have been based on the results of basic research in molecular biology and biochemistry, and the closely related disciplines of genetics, cell biology, developmental biology, and microbiology. Further improvements in health care will undoubtedly continue to benefit from the efforts of researchers trained in molecular biology and biochemistry. Such scientists also form the research core of the burgeoning biotechnology industry, which should continue to offer great opportunities for generating employment as new knowledge is applied to important problems. Molecular biologist have been the driving force behind the widely acknowledged revolution in the life sciences, and will continue to be at the forefront of scientific research for many years to come.

Demand for the program

Applicants: A large fraction of inquirers and applicants to the graduate programs of the Departments (40-50% in Biosciences; 20-30% in Chemistry) express an interest in molecular biology or biochemistry. Based on the numbers of qualified applicants interested in molecular biology and biochemistry applying to these Departments, there is sufficient student demand to mount this independent graduate program.

Current enrollment: Currently there are 22 M.Sc. and 22 Ph.D. students supervised by members of the IMBB. Since 1987 members of the IMBB have graduated 19 M.Sc and 18 Ph.D. students. Since the students in the MBB Graduate Program would otherwise enter programs in existing Departments, there will be no immediate impact on current graduate enrollments. Laboratory space is no longer a serious constraint on student numbers since the occupancy of the new South Sciences Building.

Projected demand: The highly visible and exciting successes of molecular biology and biochemistry, and the breadth of employment opportunities, are attractive to many prospective graduate students, including those with strong qualifications. Thus we anticipate that demand for entry into the program will continue to outstrip positions, enabling the selection of excellent students.

Projected enrollment: The number of students in the MBB Program should increase as recently recruited Assistant Professors expand their programs.

It is anticipated that most faculty participants in the Program will each supervise 3-6 graduate students. The number of students in the program will be limited by resources available to support graduate students and their research and by the number of faculty members associated with the program. Because of the key role of molecular biology and biochemistry at the forefront of research in most disciplines of the life sciences it is anticipated that the number of faculty and graduate students involved in the MBB Graduate Program will increase substantially over the next several years as retiring faculty in traditional biology disciplines are replaced by new faculty using the methods of molecular biology. The number of students admitted to the program may also be influenced by changes in employment opportunities for students in the program. The program can operate effectively with the 8-12 students admitted each year recently, but it is anticipated that more will be accepted in future.

Opportunities for employment of graduates.

Graduates of the M.Sc. program will find job opportunities in technical positions in research laboratories of universities, government agencies, and industries. Graduates of the Ph.D. program are likely to seek further post-doctoral training before taking academic positions or making careers in government laboratories or industry, especially the expanding biotechnology and pharmaceutical industries.

We are not aware of detailed estimates of the current numbers of candidates or employer demand for candidates trained in molecular biology and biochemistry. A 1992 Ernst and Young report on Canadian Biotechnology projected rapid growth of an industry that already employs 7,175 scientists in Canada. This industry depends on Universities to train its prospective employees, most of whom will be molecular biologists. The biotechnology industry in the USA is growing by 15% per year and provides additional employment opportunities for Canadian graduates.

Although molecular biology has existed as a discipline for only about 30 years, its practitioners now dominate biomedical research in numbers and scientific productivity. Of 31 "Hottest Research Fields" recently identified by citation analysis by the Institute for Scientific Information from all scientific disciplines, 25 were classified as molecular biology. This trend is likely to continue as molecular biological techniques are applied to other disciplines; such novel applications are an important feature of the IMBB research and graduate training programs. A large fraction of the advertisements for Ph.D. scientists placed in the interdisciplinary international journals *Science* and *Nature* require training in molecular biology.

A recent report (released November, 1994) by the Royal Society of Canada entitled "Molecular Biology and Canada's Future" points out the critical importance of the discipline in medical research and projects a great demand for young scientists trained in molecular biology in various key industries, especially pharmaceuticals and biotechnology, as well as agriculture, forestry, and aquaculture, in which Canada and B.C. have particular interest.

All of the graduates supervised by members of the IMBB have either found full time employment or continued their education at leading institutions. A recent survey of 785 Ph.D. graduates from Canadian Universities in the life sciences between 1983-1992 indicates that about 95% are employed in science (NSERC Life Sciences Allocation Reports).

IV. Present and Projected Resources and Requirements

Administrative requirements and resources

The IMBB already has a Director, who will Chair the MBB Steering Committee. The IMBB already has an Office and an Administrative Assistant, who will be responsible for administering financial aspects of the program and insuring that proper records are kept. IMBB graduate students already receive their mail from the IMBB office, which oversees the budgets of all IMBB research grants and appointments of IMBB staff and students. Since initially there will be no net increase in the number of students in either host department, clerical services for the program can be provided by the Departmental Graduate Secretaries. As the program expands it may become more effective to consolidate these clerical services in the IMBB; uncommitted FEE funds remain available for this purpose.

Faculty requirements and resources

The faculty required to mount the MBB Graduate Program are already in place in their respective Departments. A replacement for a departed IMBB member would be useful for the program, though not essential for its initiation. No TA positions will be required to offer the program. MBB graduate students will have first priority access to Teaching Assistantships in their respective Department in which their senior supervisor holds an appointment and has teaching duties.

Library resources

The current SFU Library serials collection is adequate. Recent additions made possible by cancellations have improved the quality of the serials collection. In particular, additions to the serials collection originally requested in proposals for MBB courses, and analyzed by Ralph Stanton of the Library, have been ordered. The interlibrary loan system, proximity of the superior UBC Library collection, and other methods for rapidly acquiring copies of publications, make the limitations of the SFU collection tolerable. The IMBB faculty place personal subscriptions of key journals, including several not carried by the library, in a reading room. Most of the courses are based in large measure on recent literature in serials and make little use of texts and monographs, except for background reading, since such books tend to be out of date upon publication. The utility of electronic media is rapidly improving and will reduce the dependence on traditional library collections.

Facilities available and capital requirements

The IMBB occupies the recently completed South Sciences Building which provides well designed space for MBB graduate research training. Capital allocations and equipment grants have already provided a good

collection of modern equipment housed in shared rooms. Besides research laboratories which include desk and bench space for graduate students, the building provides rooms for seminars, meetings, tissue culture, microscopy, photography, video documentation, glassware washing, media preparation, centrifuges, ultrafreezers, fermentors, radioisotope use, sea water tanks, biohazard containment, maintenance of constant temperature, distribution of mail, photocopying, and computers (including an IMBB local network Unix server, printers, and a variety of software and databases). The new 600 MHz NMR Spectrometer occupies IMBB space and is available for graduate research. New capital allocations are not required to mount the MBB Graduate Program, which will be administered through the IMBB Office, which is already outfitted with furniture and office equipment. The laboratory courses which may be offered will rely on shared and loaned research equipment and facilities of the teaching labs.

Financial Resources for Graduate Training and Research

External funds for IMBB research and graduate training are currently derived from several government agencies as well as some contracts with private companies. In general, graduate students are not engaged in contract research, though they benefit from the associated infrastructure and presence of several highly skilled technicians. It is not anticipated that external funds will be required or sought for the graduate program *per se*. The IMBB has received donations and gifts in the past which have helped fund the completion and outfitting of the South Sciences Building and an endowment for the MacMillan Bloedel-IMBB and Hemingway Nelson Architects graduate scholarships for some IMBB graduate students. The IMBB would welcome more such gifts, but its operations are not dependent on them.

The faculty members participating in this program all hold NSERC and/or MRC research grants. The 13 members of the IMBB hold research grants totalling \$1,230,047 for the current fiscal year (1994-95); total grant (research and equipment) and contract income was \$1,862,899. The value of grants and contracts should increase as newly arrived members expand their programs. Funding is received from the NSERC, MRC, BCHRF, CGAT Genome Project, NIH (USA), Muscular Dystrophy Association, the U.S. Army, and the B.C. and Yukon Heart Foundation, as well as from private companies. The average NSERC Research Grant held by members of the IMBB is \$46,149, which for a department would be one of the highest in Canada. The current and anticipated research funding for members of the IMBB is sufficient to mount an active program of graduate research training.

Appendix I (Calendar Entry)

The Graduate Program in Molecular Biology and Biochemistry (MBB)

Location: 8166 South Science Building

Telephone: 291-5630

Director: Bruce P. Brandhorst AB (Harvard), PhD (California)

The interdepartmental MBB Graduate Program is administered by a Steering Committee consisting of members of the Institute of Molecular Biology and Biochemistry (IMBB). Members of the IMBB have appointments in the Departments of Biological Sciences and Chemistry. In addition, the IMBB has Associate Members from these and other departments who may serve as Senior Supervisors.

Faculty and Areas of Research

B.P. Brandhorst	Biological Sciences (developmental biology and gene regulation)
D.L. Baillie	Biological Sciences (developmental genetics)
A.T. Beckenbach	Biological Sciences (population genetics, molecular evolution)
C.M. Boone	Biological Sciences (molecular genetics; cellular signalling)
T.J. Borgford	Chemistry (protein structure and function)
R.B. Cornell	Chemistry (membrane bound enzymes)
R.J. Cushley	Chemistry (high field NMR)
B.M. Honda	Biological Sciences (molecular biology and gene regulation)
J.V. Price	Biological Sciences (developmental genetics; cellular signalling)
W.R. Richards	Chemistry (protein biochemistry; photosynthesis)
J.K. Scott	Chemistry (immunochemistry; immunology)
D. Sen	Chemistry (nucleic acid biochemistry; chromosome structure)
M.J. Smith	Biological Sciences (molecular phylogeny and development)

Associate Members and Department

A.J. Bennet	Chemistry
A.H. Burr	Biological Sciences
B.J. Crespi	Biological Sciences
L.D. Druehl	Biological Sciences
N.H. Haunerland	Biological Sciences
E. Käfer	Biological Sciences
A. Kermode	Biological Sciences
M.M. Moore	Biological Sciences
B.M. Pinto	Chemistry
A. Plant	Biological Sciences
G.F. Tibbits	Kinesiology

Information

Information about the MBB Graduate Program and the research activities of its faculty can be obtained from: The MBB Graduate Secretary, IMBB, Simon Fraser University.

Admission

For admission requirements, refer to the *SFU Graduate General Regulations*. Applicants should normally have completed some advanced course work in biology or biochemistry.

Degree requirements

All students will be assigned a Graduate Supervisory Committee which has the authority to specify an appropriate program of course work meeting or exceeding the minimum requirements stated below.

All students are expected to attend the IMBB Research Seminar Series and to participate regularly in a journal club.

M.Sc. Program

Course Work

The minimum requirements consist of 12 semester hours of graduate course credits including MBB 801-2 and 802-2.

Research

A major part of the M.Sc. program will be devoted to original research. A thesis describing the work must be submitted and defended in accordance with *SFU Graduate General Regulations*.

Ph.D. Program

Course work

For students entering with a B.Sc. or equivalent: a minimum of 20 semester hours of course credits of which at least 15 must be at the graduate level, including MBB 801-2, MBB 802-2, and MBB 806-3. Ph.D students must normally enroll in MBB 806-3 at the earliest opportunity following 4 semesters of registration in the program. With the approval of their Supervisory Committee, students in the M.Sc. program may apply to the MBB Graduate Program Committee for transfer to the Ph.D. program.

For students entering with the M.Sc. degree: 8 semester hours of course credit of which at least 6 must be at the graduate level, including

MBB 802-2 and MBB 806-3. MBB 806-3 must be taken at first opportunity following two semesters registration in the program.

Research

The major portion of the Ph.D. program will be devoted to original research. An original Thesis which contributes to new knowledge must be presented and defended at the end of the degree program in accordance with *SFU Graduate General Regulations*. In addition, all MBB Ph.D. candidates must present a public seminar on their research.

MBB Graduate Courses

MBB 801-2 Student Seminar in Molecular Biology and Biochemistry I

Discussion of recent literature through student seminars and written reports. *Cannot be taken for credit in addition to CHEM 801.*

MBB 802-2 Student Seminar in Molecular Biology and Biochemistry II

Discussion of recent literature through student seminars and written reports. Prerequisite: MBB 801 or an M.Sc. degree. *Cannot be taken for credit in addition to CHEM 802.*

MBB 806-3 Ph.D. Graduate Research Seminar

Oral presentation and defense of a written Ph.D. research proposal. Students will be examined on their progress and grasp of knowledge relevant to the proposed research and their capacity to complete the proposed thesis research. *Open only to students in the Molecular Biology and Biochemistry graduate program. Cannot be taken for credit in addition to CHEM 806.*

MBB 811-1, MBB 812-2, MBB 813-3 Techniques in Molecular Biology and Biochemistry

Consideration of methods applied to research in molecular, cellular, and developmental biology; genetics; and biochemistry. *Can be repeated with permission of the instructor.*

MBB 821-3 Nucleic Acids

An examination of recent literature about the structure and function of DNA and RNA.

MBB 822-3 Biological Membranes

A review of recent literature on the structure, dynamics, function, and biosynthesis of membrane lipids and proteins.

MBB 823-3 Protein Structure and Function

Transition state theory; specificity in enzyme catalyzed reactions; use of recombinant DNA techniques to describe and modify enzyme catalysis, the function of enzymes in organic solvents, and the development of new catalytic activities through monoclonal antibody techniques.

MBB 824-3 Physical Biochemistry

The physical properties of biomacromolecules; modern physical methods applied to biomolecules; properties and analysis of membrane systems.

MBB 825-3 Bioenergetics

Consideration of important processes for biological energy transduction. Structure/function relationships of membrane components and other interacting macromolecular systems. *Cannot be taken for credit in addition to CHEM 825.*

MBB 826-3 Molecular Immunology

An overview of cellular and humoral immunology with emphasis on the molecular basis of immune recognition and response.

MBB 827-3 Mechanisms in Enzyme Catalysis

The study of enzyme mechanisms by a variety of techniques including spectroscopic, kinetic, radioisotopic exchange, and site-directed mutagenesis.

MBB 828-3 Spectroscopic Methods in Biochemistry

Application of spectroscopic methods including multidimensional NMR, fluorescence, circular dichroism, and FTIR for determination of biomacromolecular structure. Includes elements of protein conformation. *Cannot be taken for credit in addition to CHEM 828.*

MBB 829-3 Special Topics in Biochemistry

Consideration of recent literature concerning selected contemporary research topics. Can be taken more than once with permission of the instructor.

MBB 831-3 Molecular Evolution of Eukaryote Genomes

Examination of the dynamics of change in eukaryotic nuclear, mitochondrial, and chloroplast genome structure and organization.

MBB 832-3 Molecular Phylogeny and Evolution

Examination of the basic methods applicable to analyses of molecular phylogeny and evolution.

MBB 833-3 Developmental Genetics

Selected topics on the developmental genetics of *Drosophila*.

MBB 834-3 Topics in Developmental Biology

Selected topics including pattern formation, morphogenetic determinants, inductive interactions, and differential gene expression in embryos.

MBB 835-3 Genomic Analysis

Consideration of topics related to the structure and function of the genome with emphasis on genome mapping and sequencing projects, and computational methods for genomic sequence analysis.

MBB 836-3 Gene Expression

A consideration of the mechanisms and regulation of gene expression in eukaryotes and prokaryotes.

MBB 837-3 Molecular Genetics of Signal Transduction

Consideration of mechanisms of signal transduction using molecular genetic approaches with emphasis on the yeast *Saccharomyces cerevisiae*. Cannot be taken in addition to BISC 861.

BISC 839-3 Special Topics in Molecular Biology

Consideration of recent literature concerning selected contemporary research topics. Can be taken more than once with permission of the instructor.

MBB 871-1, 872-2, 873-3 Directed readings in Molecular Biology and Biochemistry.

Programs of directed reading and critical discussions offered by staff members to individual students according to their needs. Study programs must be approved by the MBB Graduate Program Committee.

MBB 898 M.Sc. Thesis

MBB 899 Ph.D. Thesis

Courses offered in other SFU Programs

Attention is drawn to CHEM 752-3 Advanced Bio-Organic Chemistry, CHEM 754-3 Carbohydrate Chemistry, CHEM 811-3 Crystal Structure Analysis, ~~and~~ BISC 8xx Plant Molecular Biology and Biotechnology, and BISC 8xx Molecular Biology of Plant Development.

Graduate Course Work at other Universities

Upon the recommendation of the Supervisory Committee, and with the approval of the Graduate Program Committee, up to 6 credits of course work taken elsewhere not resulting in a degree may be applied toward degree requirements at SFU, but not exceeding more than half of the course credits required in addition to MBB 801-2, MBB 802-2, and 806-3.

Proposed Changes to the Calendar under Graduate Science

p 307-308: Delete entire section concerning the Institute of Molecular Biology and Biochemistry

p. 310: Under the section **Biochemistry and Molecular Biology** replace the existing paragraph with:

Students wishing to undertake graduate studies in molecular biology or biochemistry should refer to the description of the Molecular Biology and Biochemistry Graduate program in the *Graduate Science* section.

p 312: Under the section **Biochemistry** replace the existing paragraph with:

Students wishing to undertake graduate studies in biochemistry should refer to the description of the Molecular Biology and Biochemistry Graduate program in the *Graduate Science* section.

Appendix 2

Graduate Program and Molecular Biology and Biochemistry

Relationship of proposed courses to existing CHEM and BISC graduate courses.

MBB 801, 802, and 806 are new courses, but in essence replace CHEM 801, 802, 805 and 806 (which will continue to serve Chemistry students)

MBB 811-813 are new courses but will not be given with regularity.

MBB 821, 822, and 823 were previously offered as CHEM 823, a special topics course.

MBB 824 is a new course; a less sophisticated version has been offered as BICH 424.

MBB 825 replaces CHEM 825.

MBB 826 is a new course.

MBB 827 is a new course.

MBB 828 has been offered as CHEM 824

MBB 829 replaces the special topics course CHEM 823

MBB 831 and 832 have been offered as a special topics BISC course, which is being expanded to two courses.

MBB 833 has been offered as a special topics BISC course.

MBB 834 has been offered as a special topics BISC course

MBB 835 has been offered as a special topics course.

MBB 836 has been offered as a special topics BISC course

MBB 837 has been offered twice as BISC 861

MBB 839 replaces the special topics course BISC 881

MBB 871-873 are new courses, offered in place of Directed Reading courses in CHEM and BISC. They will be offered infrequently.

Summary: Effectively, four new courses are proposed to be offered on a regular basis in this graduate program. The addition of six new faculty to the IMBB over the past 6 years make it possible to mount these courses on the projected schedule.

A tentative four year schedule of MBB courses is attached. Some deviation may result from sabbaticals etc. The program can be mounted without interfering with undergraduate teaching responsibilities in the Biochemistry and Biosciences programs, which have taken a priority in creating this projected schedule. According to this schedule 11-13 MBB graduate courses per year would be offered, or approximately one for each IMBB faculty member.

IMBB Graduate Courses

95-2	95-3	96-1	96-2	96-3	97-1	97-2	97-3	98-1	98-2	98-3	99-1	99-2
	MBB 801			MBB 801			MBB 801			MBB 801		
	MBB 802			MBB 802			MBB 802			MBB 802		
		MBB 806			MBB 806			MBB 806			MBB 806	
		MBB 821			MBB 821						MBB 821	
		MBB 822			MBB 822			MBB 822				
	MBB 823						MBB 823					
				MBB 824			MBB 828			MBB 824		
		MBB 825						MBB 825				
	MBB 826				MBB 826		MBB 826				MBB 826	
				MBB 827						MBB 827		
					* MBB 831							
MBB 832						MBB 832						MBB 832
		MBB 833						MBB 833				
					* MBB 834							
			MBB 835						MBB 835			
				MBB 836						MBB 836		
		MBB 837			MBB 837 ?			MBB 837			MBB 837 ?	

* Timing depends on anticipated sabbaticals not yet approved.

Appendix 3

Graduate Program and Molecular Biology and Biochemistry

Budgetary Implications for the Library (December, 1994)

After the courses proposed for this new program were compiled, including lists of serials and books, the cost to the Library for projected acquisitions was analyzed by Ralph Stanton in his report (Feb. 23, 1994). He identified a one time cost of \$388 for monographs/books and a recurring cost of \$3517 for serials. Of the monographs, the only essential addition is a \$35 book for MBB 832; other books listed by Mr. Stanton constitute additional copies and/or are not essential, only desirable background reading. A recent reevaluation of the serials collection by the Faculty of Science Library Committee resulted in several cancellations, making possible the acquisition of most or all of the serials on our required list. It thus appears that the serials collection is adequate for mounting the proposed courses.

Our graduate courses rely almost entirely upon the use of recent literature published in serials. Books and monographs, which are almost immediately out of date for a course oriented toward current research, are generally used only for unassigned background reading, and the library collection is adequate for this purpose (though some of the books are kept on reserve for undergraduate courses, which may restrict access).

The library books and serials collection can thus be described as adequate. We assume that important books will continue to be added to the collection as needed (and we are willing to provide guidance in this respect). We also anticipate that the science serials collection will be reviewed periodically to ensure that it efficiently serves a broad base of users whose learning, teaching, and research activities are evolving.

Some MBB courses may need to make use of interlibrary loans, electronic media, serials loaned by faculty members who hold personal subscriptions (in particular for back issues of serials not previously held by the Library), or methods for rapid acquisition of copies of articles from serials not held by the library.

The Dean of Science has indicated that the Faculty will make funds available to acquire any essential books and serials not already held.

There will be no further requests for new acquisitions by the library specifically associated with the courses of the proposed MBB Graduate Program (most of which have been previously taught). However, the evolution of these courses and development of new courses may generate requests for acquisitions in the future.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 801-2
Department: Molecular Biology and Biochemistry
Title: Student Seminar in Molecular Biology and Biochemistry I
Description: Students will present seminars and prepare written reports on important research topics in the current literature.
Credit Hours: 2 Vector: 2-0-0 Prerequisite(s) if any: --

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 10-15 When will the course first be offered: 95-3
How often will the course be offered: Once per year.

JUSTIFICATION:

Students require experience interpreting, evaluating, and presenting the results of experiments. A range of topics will be selected to provide a sampling of current research fronts. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: TBA
What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: BAM, Klocum, R. Kartelins Date: 12/1/95
Faculty Graduate Studies Committee: _____ Date: _____
Faculty: CHW. Jones Date: 18/1/95
Senate Graduate Studies Committee: BPC Date: Jan 18/95
Senate: 26 Date: _____

MBB 801-2

STUDENT SEMINAR IN MOLECULAR BIOLOGY AND BIOCHEMISTRY I

Instructors:

To be selected from the staff of the Graduate Program in Molecular Biology and Biochemistry.

Course Format:

Students will present seminars on important research topics in the recent literature. Topics will be selected from a list suggested by staff and will vary from year to year. Students will be expected to read literature related to each topic, write reports on selected topics, and participate in discussions.

Evaluation:

Students will be evaluated on the basis of the quality of their seminars, written reports, and participation in discussions.

Competence of the Instructors:

The instructors have research expertise and teaching experience in molecular biology and biochemistry.

Library Resources:

The library serials collection is adequate.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 802-2
Department: Molecular Biology and Biochemistry
Title: Student Seminar in Molecular Biology and Biochemistry II
Description: Students will present seminars and prepare written reports on important research topics in the current literature.
Credit Hours: 2 Vector: 2-0-0 Prerequisite(s) if any: MBB 801

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 10-15 When will the course first be offered: 95-3
How often will the course be offered: once per year

JUSTIFICATION:

Students require experience interpreting, evaluating, and presenting the results of experiments. A range of topics will be selected to provide a sampling of current research fronts. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: TBA
What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: [Signature] Date: 12/1/95
Faculty Graduate Studies Committee: _____ Date: _____
Faculty: CHW. Jones Date: 12/1/95
Senate Graduate Studies Committee: [Signature] Date: Jan 18/96
Senate: 28 Date: _____

MBB 802-2

STUDENT SEMINAR IN MOLECULAR BIOLOGY AND BIOCHEMISTRY II

Instructors:

To be selected from the staff of the Graduate Program in Molecular Biology and Biochemistry.

Course Format:

Students will present seminars on important research topics in the recent literature. Topics will be selected from a list suggested by staff and will vary from year to year. Students will be expected to read literature related to each topic, write reports on selected topics, and participate in discussions.

Evaluation:

Students will be evaluated on the basis of the quality of their seminars, written reports, and participation in discussions.

Competence of the Instructors:

The instructors have research expertise and teaching experience in molecular biology and biochemistry.

Library Resources:

The library serials collection is adequate.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: _____
Department: Molecular Biology and Biochemistry Course Number: MBB 806
Title: Ph.D. Graduate Research Seminar
Description: A written research proposal, oral presentation, and defense of the Ph.D. research project.
Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 6-10 When will the course first be offered: 96-1
How often will the course be offered: Once per year

JUSTIFICATION:

The course is presented in lieu of a Ph.D. candidacy (qualifying) exam. It will evaluate the proposed thesis research project, and provide useful practice in grant writing, formal presentation of scientific arguments, and defense of one's point of view. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: TBA
What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: B. Brocklebank Date: 12/1/95
Faculty Graduate Studies Committee: _____ Date: _____
Faculty: Chw. Jones Date: 18/1/95
Senate Graduate Studies Committee: B. P. Cole Date: Jan 18/95
Senate: 30 Date: _____

MBB 806-3

Ph.D. GRADUATE RESEARCH SEMINAR

Instructors:

Two or three instructors will be selected each year from among the staff of the Graduate Program in Molecular Biology and Biochemistry. In addition, the members of the Graduate Supervisory Committee for each student will be present as examiners.

Course Outline:

Each student will prepare a written proposal of Thesis Research using the format of the NSERC Grant Application Form. The proposal should include a statement of the goals for the research program, a review of the most significant literature related to the research topic, a summary of research progress, and a description of the proposed research, including a consideration of the methods to be used. The student will present a seminar on the proposed thesis research project, and will be examined by the course staff. Students enrolled in the course will attend the seminar/examination and may participate in the questioning.

Evaluation:

This course is offered in lieu of a candidacy exam. Failure to pass this course will result in withdrawal from the program. Students who do not initially pass this course may be granted an Incomplete grade and given a second opportunity to pass the course within an agreed period of time.

Evaluation will be based on the student's capacity to effectively communicate concerning the subject matter of the proposed Thesis Research, the grasp of knowledge relevant to the proposed research, and the capacity to complete the proposed program of Thesis Research.

Competence of Course Staff

The instructors will be selected to represent a broad view of molecular biology and biochemistry. Members of the Graduate Supervisory Committees are selected on the basis of their expertise in the area of proposed research.

Library Resources:

Library resources are adequate. Students may need to use other resources to obtain all the pertinent literature related to their research topic.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 811, 812, 813

Title: Techniques in Molecular Biology and Biochemistry

Description: Practical experience in current methods used in molecular biology and biochemistry.

Credit Hours: 1, 2, 3, respectively Vector: 0,0,3-9 Prerequisite(s) if any: None

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 3-10 When will the course first be offered: TBA

How often will the course be offered: Intermittently, as needed.

JUSTIFICATION:

The three courses allow the rapid mounting of courses (of appropriate credit weight) considering important new methods as they emerge or established methods of broad utility. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: TBA

What are the budgetary implications of mounting the course: None at present. In future, acquisition of appropriate equipment might be required. Supplies will be provided through funds from the IMBB operating budget.

Are there sufficient Library resources (append details): Yes.

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: [Signature] Date: 12/1/95
Faculty Graduate Studies Committee: _____ Date: _____
Faculty: CHW. Jones Date: 18/1/95
Senate Graduate Studies Committee: B.P.C.C. Date: Jan 18/95
Senate: 32 Date: _____

MBB 811-1, 812-2, 813-3

TECHNIQUES IN MOLECULAR BIOLOGY AND BIOCHEMISTRY.

Instructors:

Will be selected from among the staff of the Molecular Biology and Biochemistry Graduate Program.

Outline:

These courses will offer laboratory training in specific specialized techniques. Possible topics will include methods applied to contemporary research in molecular, cellular, and developmental biology, genetics and biochemistry, including laboratory demonstrations, hands-on exercises, and computer workshops. Course content will depend on student demand and opportunities provided by the development of important new technologies. Scheduling will depend on availability of appropriate laboratory space and/or facilities. Courses will be offered during all or part of a semester, but usually as an intense but short course having appropriate credit weighting. The course can be repeated with permission of the instructor.

Competence of the Instructor:

The instructor offering the course would be one experienced with the techniques.

Library Resources:

The library resources are adequate for offering these courses.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 821-3
Department: _____

Title: Nucleic Acids

Description: An examination of recent literature for revelations about the structure and function of DNA & RNA, drawing on a variety of chemical, biochemical and molecular biological perspectives.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 8 - 10 When will the course first be offered: 96-1

How often will the course be offered: Twice every three years

JUSTIFICATION:

It will be part of the MBB graduate program.
Nucleic acids are crucial elements of the genetic structure and function of all cells. Familiarity with nucleic acids is required for all molecular biologists and biochemists engaged in genetic manipulations. Replaces CHEM 823, Special Topics.

RESOURCES:

Which Faculty member will normally teach the course: Dr. Dipankar Sen

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes. Two textbooks recommended for the course are kept on reserve.

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: [Signature] Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: [Signature] Date: 18/1/95

Senate Graduate Studies Committee: [Signature] Date: 18/1/95

Senate: 34 Date: _____

A) Outline of the course:

MBB 821-3
NUCLEIC ACIDS

The course will be conducted as a combination of lectures by the instructor and short presentations on current research papers by individual students.

The following topics will be covered:

1. Sugars, bases, and nucleotides
2. DNA structure
3. Chromatin
4. DNA superhelicity
5. RNA structure
6. RNA - ligand interactions
7. Catalytic RNA
8. DNA - ligand interactions

B) Instructor's competence:

Dr. Sen received training in nucleic acid biochemistry at Yale and Harvard Universities. With Nobel laureate Walter Gilbert he published several seminal papers on DNA structure and function in the leading journals *Nature* and *Biochemistry*. His current research continues to focus on novel structures of nucleic acids and their function, as well as chromosome structure and function. He has taught this course twice previously as a very popular special topics course (CHEM 823).

C) Library resources:

The library resources are adequate. Copies of the text books are already placed on reserve when the course is offered. They are "Principles of Nucleic Acid Structure" by Wolfram Saenger (Springer Verlag) and "Nucleic Acids Chemistry and Biology" by G.M. Blackburn (IRL Press). The essential journals are already part of the collection.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: _____
Department: Molecular Biology and Biochemistry Course Number: MBB 822-3

Title: Biological Membranes

Description: Survey of recent literature on the structure, dynamics, function, and biosynthesis of membrane proteins and lipids.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: Permission of Instructor.

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 6-10 When will the course first be offered: 96-1

How often will the course be offered: Twice every three years.

JUSTIFICATION:

Replaces CHEM 823. Special Topics: Will be part of the MBB graduate program.
Biological membranes surround all cells and have essential roles in the structure, function, organization, and communication of cells. The course concerns one of topics of research focus of the MBB Graduate Program.

RESOURCES:

Which Faculty member will normally teach the course: Dr. R.B. Cornell

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: B.M. Keenan Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHW. Jones Date: 12/1/95

Senate Graduate Studies Committee: B.P.C. Date: Jan 18/95

Senate: 36 Date: _____

MBB 822-3

BIOLOGICAL MEMBRANES

Instructor: R. Cornell
Prerequisites: Permission of instructor
Required Text: Biomembranes, by Robert Gennis

I. MEMBRANE STRUCTURE AND DYNAMICS	CHAPTER IN GENNIS
A. Diversity and similarity in biological membranes - Membrane Models - Membrane Composition	1
B. Thermodynamics of micelle/membrane assembly - The hydrophobic effect	2.3
C. Lipid polymorphism - Determinants of micelle size and shape - Lipid polymorphism and the regulation of membrane lipid composition	2 (10.5)
D. Phospholipid structure from crystals	2.1
E. Phase transitions of pure lipids and lipid mixtures - Influence of acyl chains - Influence of polar head groups - Effects of pH, cations, cholesterol - Phase separations	2.2 2.4
F. Phospholipid dynamics - Spectroscopic methods for characterizing the interior of the bilayer.	5
G. Rotational and lateral diffusion rates of lipids and proteins - Implications for protein-protein interactions	5
H. Lipid Asymmetry and Trans-bilayer Flip-flop	4
I. General themes in the structure of membrane proteins - Classification - Predictive algorithms for topography - Crystal structures	3
J. Domains in Membranes - Lipid and protein	4

CHAPTER IN GENNIS

II. LIPID-PROTEIN INTERACTIONS	
A. Covalently Bound Lipid	3.8
B. Lipid boundary layers	
- Conflicts and resolution of NMR and ESR data	5.5
C. Solubilization, Reconstitution and Purification of Membrane proteins	6
D. Enzyme requirements for specific lipids	6
- Acetylcholine receptor	
- Cytochrome oxidase	
- Cytidylyltransferase	
E. Model systems for studying lipid-protein interactions - amphiphilic peptides and liposomes	
III. TRANSPORT OF SMALL MOLECULES AND IONS THROUGH MEMBRANES	8
A. Thermodynamics of Transport. Categories of transporters.	
B. Channel structure and function exemplified by K ⁺ channel.	
C. ATPase ion pump structure and function.	
IV. MEMBRANE BIOGENESIS	
A. Mechanism of protein translocation across membranes during biosynthesis	10
- Thermodynamic models	10.1 - 10.3
- Signal Hypothesis	
B. Requirements for Protein Translocation:	
- Signal Peptides	
- Unfolded conformation	
C. Regulation of membrane lipid synthesis and transport	10.4
- <i>E. coli</i> , yeast, mammalian cells	
V. ROLE OF PLASMA MEMBRANES IN SIGNAL TRANSDUCTION	9
A. Receptors - classification and characteristics	9.7, 9.8
B. Membrane lipids involved in signal transduction	
- PIP ₂ metabolism (inositol-P signaling system)	
- Diacylglycerol, modulation of protein Kinase C	9.73
- PC metabolism	
VI. REPORTS FROM STUDENTS	

Competence of Instructor:

Dr. Cornell received graduate and postdoctoral training in the biochemistry of lipids and membranes at U. Pennsylvania, UBC, and U. Toronto. She has published in leading journals on membrane structure, lipid-protein interactions, and signal transduction mediated by phospholipids; she has given many invited lectures. Her research is supported by the Medical Research Council, for which she has served as a member of a grant selection committee. Dr. Cornell has taught courses 4 times as a special topics course (CHEM 823).

Library Resources:

The library resources are adequate.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 823-3
Department: _____

Title: Protein Structure and Function

Description: Recent research in transition state theory; specificity in enzyme catalyzed reactions, the use of recombinant DNA techniques to describe and modify enzyme catalysis, the function of enzymes in organic solvents, and the development of new catalytic activities through monoclonal antibody techniques.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5-10 When will the course first be offered: 95-3

How often will the course be offered: Once per year

JUSTIFICATION:

The course focuses on recent experimental approaches to understanding the structure and function of proteins, especially enzymes. This is a focus of research activity in the IMBB. It complements MBB 827. Cannot be taken for credit in addition to BICH 423. It will be part of the MBB graduate program. Previously taught as a special topics course

RESOURCES:

Which Faculty member will normally teach the course: Dr. Thor Borgford

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: B. McKeown Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: Chw. Jones Date: 18/1/95

Senate Graduate Studies Committee: B.P.C. Date: Jan 18/95

Senate: 40 Date: _____

a) Outline of the course

MBB 823-3

PROTEIN STRUCTURE AND FUNCTION

- Instructor: T. Borgford
- Course description: This course is designed to familiarize students with current topics in the study of protein (enzyme) structure and function. Lectures will involve discussion of recent publications in the subject areas, in which all students will be expected to participate.
- Course outline: Topics to be covered will include:
Transition state theory
The nature of specificity in enzyme catalyzed reactions
The use of recombinant DNA techniques to describe and modify enzyme catalysis
The function of enzymes in organic solvents
The development of entirely new catalytic activities through monoclonal antibody techniques (Abzymes).
- Course evaluation: Grades will be based on 5 written assignments and one classroom seminar.

b) Competence of instructor

Dr. Borgford received training in protein biochemistry and use of site directed mutagenesis for protein engineering at U. Manitoba, U. Alberta, and Imperial College, London. He has published in leading biochemistry journals and leads a large contractual research team engaged in genetic engineering of proteins. His research expertise is directly related to the topics of this course. He has taught this course several times previously as a special topics course.

c) Library resources

Library materials are adequate and no additional requirements are anticipated at this time. On-line databases of protein structural information will be used.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: _____
Department: Molecular Biology and Biochemistry Course Number: MBB 824-3

Title: Physical Biochemistry

Description: The physical properties of biomacromolecules and their use in determining molecular weight and conformation; modern physical methods applied to biomolecules; properties and analysis of membrane systems.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: CHEM 261, BICH 321
(or BICH 301) or equivalent (see instructor)

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5 grads When will the course first be offered: 96-3

How often will the course be offered: Every two years

JUSTIFICATION:

For graduate students lacking an introductory course in physical biochemistry.
Cannot be taken in addition to BICH 403-3. It will be part of the MBB graduate program.
This introduction to physical biochemistry is for students who do not have the
equivalent of BICH 403, an essential course for all biochemistry students.

RESOURCES:

Which Faculty member will normally teach the course: Dr. R.J. Cushley

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: [Signature] Date: 12/1/95
Faculty Graduate Studies Committee: _____ Date: _____
Faculty: CHW. Jones Date: 18/1/95
Senate Graduate Studies Committee: [Signature] Date: Jan 15/95
Senate: 42 Date: _____

a) Outline of the course

MBB 824-3

PHYSICAL BIOCHEMISTRY

Instructor: Dr. R.J. Cushley

Prerequisites: CHEM 261, BICH 321 (or BICH 301) or equivalent (see instructor).

Course Description: **Section 1 - Physical Properties of Biomacromolecules**
Thermodynamic Review
Solution Thermodynamics
Irreversible Thermodynamics
Phenomenological Theory
Diffusion
Hydrodynamics
Electrophoresis

Section 2 - Physical Methods (Structure and Conformation of Biomacromolecules)
Light Scattering
ORP/CP
Laser Raman
Intensity Fluctuation
Fluorescence Spectroscopy
NMR

One tutorial per week will be given and will cover review and update of related topics (e.g., thermodynamics, mathematical methods), problem sets and demonstrations appropriate to the subject matter.

Textbooks: Biophysical Chemistry. Part II: Techniques for the Study of Biological Structure and Function, C.R. Cantor, and P.R. Schimmel, W.H. Freeman & Co. Publishers, 1980, ISBN 0-7167-1190-7 - Required.

and

Physical Biochemistry, 2nd Edition, K.E. Van Holde, Prentice-Hall Publishers, 1985, ISBN 0-13-666272-2 - Required.

Mark Distribution:

Midterm Examination	30%
Final Examination	70%

WAB 8224

b) Competence of the Instructor

Dr. Cushley was trained in physical biochemistry and organic chemistry in a leading Canadian research group at U. Alberta, did research at Sloane Kettering Institute and Cornell, and served on the Faculty at Yale University. He has an extensive publication record based on the use of physical biochemical methods to investigate biological macromolecules. His particular research expertise is with spectroscopic methods, especially high field nuclear magnetic resonance. A recent sabbatical increased his expertise in 3-D NMR analysis.

c) Library resources

The library collection is adequate.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 825-3
Department: Molecular Biology and Biochemistry

Title: Bioenergetics

Description: Consideration of important processes for biological energy transduction. Structure/function relationships of membrane components and other interacting macromolecular systems.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5-10 When will the course first be offered: 96-1

How often will the course be offered: Once every two years

JUSTIFICATION:

This course is a re-designation of CHEM 825-3, which will be dropped. The latter course has been offered many times by the Chemistry Department (the last time in 92-1) with good enrollments. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: Dr. W.R. Richards

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: [Signature] Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHW. Jones Date: 18/1/95

Senate Graduate Studies Committee: [Signature] Date: 9/18/95

Senate: 45 Date: _____

MBB 825-3
BIOENERGETICS

Instructor: Dr. W.R. Richards

Course description: Consideration of important processes for biological energy transduction. Structure/function relationships of membrane components and other interacting macromolecular systems.

Course outline: Specific topics will include:

1. Introduction and review of membrane structure and principles of bioenergetics.
2. The nature of the "energized state" of biomembranes and mechanisms for the formation of ATP during electron transport reactions.
3. Bacteriorhodopsin: The "photo-activated-proton-pump" of *Halobacteria*.
4. Bacterial and greenplant photosynthesis.
5. Attempts to construct an artificial biological "solar battery."
6. Mitochondrial oxidative phosphorylation, mitochondrial inner membrane transport systems, and thermogenesis.
7. Bacterial electron transport chains, cytoplasmic membrane transport systems, motility, chemotaxis, and phototaxis.
8. Eukaryotic membrane transport systems, including cytoplasmic membrane, sarcoplasmic reticulum, and neural membranes (nerve impulse transmission).

Competence of the Instructor:

Trained in protein biochemistry and biophysics at the University of California, Prof. Richards carries out research on enzymes involved in energy transduction in photosynthetic bacteria and plants and publishes in leading biochemistry journals. He has taught this course as CHEM 825 several times.

Library resources

The collection of books and serials continues to be adequate for this biochemistry course.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 826-3
Department: _____

Title: Molecular Immunology

Description: An overview of cellular and humoral immunology with emphasis on the molecular basis of immune recognition and response. Areas to be covered: (i) the organization of the immune system, (ii) B-cells and the antibody response, (iii) T-cells and the control of the immune response, and (iv) the diversity of the immune response, including immunity to pathogens, hypersensitivity, autoimmunity and tissue transplantation.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: BICH 322 and BISC 322 or equivalent.

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 10 When will the course first be offered: 95-3

How often will the course be offered: Every year

JUSTIFICATION:

A course in immunology should be available in any undergraduate or graduate program in biochemistry, molecular and cell biology. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: Dr. Jamie K. Scott

What are the budgetary implications of mounting the course: Minimal

Are there sufficient Library resources (append details): Generally adequate, but the addition of two journals is strongly recommended.

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: Bram-Klown R. K. [Signature] Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHW. SONS Date: 18/1/95

Senate Graduate Studies Committee: B.P.C. Date: 18/1/95

Senate: 47 Date: _____

a) Outline of the Course

MBB 826-3

MOLECULAR IMMUNOLOGY

Instructor: Jamie K. Scott

Course description: An overview of cellular and humoral immunology with emphasis on the cellular and molecular bases of immune recognition and response. Areas to be covered include (i) the organization of the immune system, (ii) B-cells and the antibody response, (iii) T-cells and the control of the immune response, and (iv) the diversity of the immune response, including immunity to pathogens, hypersensitivity, autoimmunity and tissue transplantation. The course will comprise three hours of lecture and one hour of student presentations of articles from the literature each week.

Course outline:

- A. The organization of the immune system
 - 1. The anatomy and physiology of the lymphoid organs
 - 2. Cells of the lymphoid system
 - 3. Effector molecules of the immune system
 - 4. Diversity of the immune response
 - 5. Ontogeny of the immune system

- B. B-cells and the antibody response
 - 1. Antibody structure, function and genetics
 - 2. B-cell differentiation and the humoral immune response
 - 3. B-cell ontogeny

- C. T-cells and the control of the immune response
 - 1. The structure, function and genetics of T-cell receptors and major histocompatibility antigens
 - 2. T-cell differentiation and the cellular immune response
 - 3. T-cell ontogeny and the development of self vs non-self recognition

- D. The diversity of the immune response
 - 1. Immunity to viruses, bacteria and parasites
 - 2. Hypersensitivity reactions
 - 3. Autoimmunity
 - 4. Tissue transplantation and graft rejection

b) Competence of the Instructor

Dr. Scott received Ph.D. training in molecular biology and immunology. She then completed an M.D. degree and returned to postdoctoral research in molecular immunology. With her mentor, she invented the technology for producing and utilizing phage display epitope libraries for a broad range of biomedical research problems, such as vaccine

development. She has given many invited lectures on this subject and collaborates widely in her research. She serves on a grant selection committee for the National Cancer Institute.

c) Library Resources.

The library holdings are adequate for the most part. The instructor will make available copies of papers from her personal collection. Over a period of time, the collection of serials should evolve to better represent the biomedical sciences, a primary area of research activity for biochemists and molecular biologists, but no further additions to the collection are essential for this course.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 827-3
Department: _____

Title: Mechanisms in Enzyme Catalysis

Description: The study of enzyme mechanisms by a variety of techniques including spectroscopic, kinetic, radioisotopic exchange, and site-directed mutagenesis. The participation of coenzymes and amino acid functional groups in enzyme catalysis.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: 96-3

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: _____ When will the course first be offered: _____

How often will the course be offered: Once every two years

JUSTIFICATION:

This course will examine enzyme mechanisms at an advanced level. It complements MBB 823, focusing on kinetic approaches to investigating enzyme function. It will be part of the MBB graduate program, part of the focus on protein structure and function.

RESOURCES:

Which Faculty member will normally teach the course: W.R. Richards, T.J. Borgford

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: [Signature] Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHW. Jones Date: 12/1/95

Senate Graduate Studies Committee: BPCG Date: Jan 18/95

Senate: 50 Date: _____

a) Outline of the course:

MBB 827-3

MECHANISMS IN ENZYME CATALYSIS

Instructor(s): W.R. Richards, T.J. Borgford

Course description: The study of enzyme mechanisms by a variety of techniques including spectroscopic, kinetic, radioisotopic exchange, and site-directed mutagenesis. The participation of coenzymes and amino acid functional groups in enzyme catalysis.

Course outline: Specific topics will include:

1. The study of enzyme mechanisms by kinetic techniques: Pre-steady state *versus* steady state kinetics. Sigmoidal kinetics and allosteric enzymes.
2. Fast reaction kinetics: stopped-flow, continuous-flow, and quenched-flow methods. Relaxation kinetics: temperature-jump and pressure-jump methods.
3. Methods of detection of enzyme-catalyzed reactions: spectroscopic and isotopic exchange methods.
4. Active-site directed and enzyme-activated irreversible inhibitors: affinity labels and suicide inhibitors.
5. Substrate binding and enzyme-substrate complementarity: transition state analogues and abzymes.
6. Examples of enzyme mechanisms. The participation of coenzymes and amino acid functional groups in enzyme catalysis. The stereochemical specificity of enzyme action.
7. The use of site-directed mutagenesis in the study of enzyme mechanisms.

b) Competence of the Instructor

Dr. Richards is a protein biochemist who has taught enzymology (BICH 412) several times. He has research expertise on purification and kinetic reaction mechanisms of enzymes and the use of photoaffinity labels. Dr. Borgford's research interests include mechanisms of enzyme catalysis. His experimental approach, using protein engineering techniques, complements the more traditional purification and kinetic approaches to enzymology of Dr. Richards. This new course will benefit from the complementarity of expertise of the two instructors.

c) **Library resources**

The library collection is adequate. It will be supplemented by personal subscriptions and the use of on-line databases.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: _____
Department: Molecular Biology and Biochemistry Course Number: MBB 828-3

Title: Spectroscopic Methods in Biochemistry

Description: Application of spectroscopic methods including multidimensional NMR, fluorescence circular dichroism, and FTIR for determination of biomacromolecular structure. Emphasis will be on the determination of protein structure. Includes elements of protein conformation, e.g., secondary motifs, predictive methods, epitope mapping and protein folding.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: BICH 403 or 824 or equivalent

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5 When will the course first be offered: 97-3

How often will the course be offered: Every two years

JUSTIFICATION:

Replaces CHEM 824-3. Course title better reflects course content, which emphasizes application of spectroscopic methods. MBB 824-3 serves as a broader introduction to physical biochemistry. It will be part of the MBB graduate program, part of the focus on protein structure and function.

RESOURCES:

Which Faculty member will normally teach the course: Dr. R.J. Cushley

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: BAM-Kearney Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHW. Jones Date: 18/1/95

Senate Graduate Studies Committee: BPCL Date: Jan 18/95

Senate: 53 Date: _____

a) Outline of the course

MBB 828-3

SPECTROSCOPIC METHODS IN BIOCHEMISTRY

Instructor: Dr. R.J. Cushley

Course description: Application of spectroscopic methods including multidimensional NMR, fluorescence, circular dichroism, and FTIR for determination of biomacromolecular structure. Emphasis will be on the determination of protein structure. Includes elements of protein conformation, e.g., secondary motifs, predictive methods, epitope mapping and protein folding.

Course outline: I. Protein Structure

1. Elements of protein structures
2. Prediction of protein secondary structures - Chou-Fasman, hydrophobic moments, etc.
3. Epitope mapping
4. Protein folding

II. Spectroscopic Methods

1. Multidimensional NMR
 - a) Chemical shifts and scalar interactions
 - b) Relaxation processes
 - c) Nuclear Overhauser effect
 - d) Resonance assignments and structure determination
 - e) Distance geometry, simulated annealing, RMA
 - f) "Nuts and Bolts"
 - g) New advances
2. Fluorescence (if time permits)
 - a) Fluorescent probes and protein and nucleic acid structure
 - b) Rotational correlation times
3. Circular dichroism and FTIR (if time permits)

b) Competence of the Instructor

Dr. Cushley was trained in physical biochemistry and organic chemistry in a leading Canadian research group at U. Alberta, did research at Sloane Kettering Institute and Cornell, and served on the Faculty at Yale University. He has an extensive publication record based on the use of physical biochemical methods to investigate biological macromolecules. His

particular research expertise is with spectroscopic methods, especially high field nuclear magnetic resonance. A recent sabbatical increased his expertise in 3-D NMR analysis. He has taught this course previously.

c) Library resources

The library collection is adequate.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 829
~~Department:~~

Title: Special Topics in Biochemistry

Description: A detailed consideration of selected contemporary research topics in
biochemistry.

Credit Hours: 3 Vector: _____ Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5 - 10 When will the course first be offered: TBA

How often will the course be offered: Intermittently, as required.

JUSTIFICATION:

This course provides an opportunity to quickly mount a new graduate course in an
emerging research front or in accordance with special opportunities, such as the
arrival of a new faculty member. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: TBA

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: [Signature] Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: [Signature] Date: 1/8/1/95

Senate Graduate Studies Committee: [Signature] Date: 1/18/95

Senate: 56 Date: _____

MBB 829-3

SPECIAL TOPICS IN BIOCHEMISTRY

Instructor:

To be selected from among the staff of the Graduate Program in Molecular Biology and Biochemistry.

Outline:

A detailed consideration of recent literature concerning important contemporary topics in biochemistry and related disciplines. Topics will change from year to year, and this course can be taken more than once with permission of the instructor. The topics will not be covered in depth in other MBB graduate course offerings. This course allows an opportunity to quickly provide graduate instruction in newly developing areas of research or in response to special circumstances, such as the presence of a new or visiting faculty member. The instructor(s) will decide on the format of the course, with the approval of the MBB Graduate Program Committee.

Competence of the Instructor:

The course will be offered by an Instructor having research expertise or specialized knowledge in the topic covered.

Library Resources:

The books and serials collection of the library are adequate.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: _____
Department: MBB Course Number: 831-3

Title: Molecular Evolution of Eukaryote Genomes

Description: Examination of the dynamics of change in eukaryotic nuclear, mitochondrial, and chloroplast genome structure and organization including mechanisms of gene conversion, transposition, and duplication.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: Graduate standing in cell or molecular biology or permission of the instructor.

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 6-15 When will the course first be offered: 97-1

How often will the course be offered: In alternate years, to alternate with MBB 832.

JUSTIFICATION:

The organization of eukaryote genomes has been molded over evolutionary history by a variety of genetic processes, including gene duplication, gene conversion, transposition of mobile elements. In order to understand how genomes function, it is essential to examine the processes involved in their evolution. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: Beckenbach, Smith

What are the budgetary implications of mounting the course: None, the course will depend on the primary molecular biology and evolution literature. Beckenbach and Smith have already offered similar courses as special topics.

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: B. Beckenbach Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CTW. Jones Date: 18/1/95

Senate Graduate Studies Committee: B.P.C. Date: Jan 18/95

Senate: 58 Date: _____

a) Outline of the Course

MBB 831-3

MOLECULAR EVOLUTION OF EUKARYOTE GENOMES

- I. Nuclear genomes
 - A. Characteristics of its organization
 - i. Exons, introns, regulatory elements and non-coding regions.
 - ii. Clustered and dispersed repetitive DNA.
 - iii. Satellite DNA, telomeres and pairing regions
 - iv. Transposable elements
 - v. X-Y chromosome differentiation
 - B. Dynamics of change
 - i. Gene duplication
 - ii. Concerted evolution
 - iii. Exon shuffling
 - iv. Origin of introns
 - v. Transposition of mobile elements
- II. Mitochondrial genomes
 - A. Organization of animal and plant mitochondrial genomes
 - B. Mechanisms of change
 - i. Point mutations
 - ii. Gene rearrangements
 - C. Mathematical models of gene organization changes
- III. Chloroplast genomes
 - A. Organization and gene content
 - B. Mechanisms of rearrangement
 - C. Transcription and RNA editing--evidence and mechanisms
- IV. Nucleo-cytoplasmic interactions
 - A. Genetic interactions
 - B. Transfer of gene functions from organellar to nuclear genomes

b) Competence of Faculty:

Both listed faculty have been publishing internationally recognized research in the area of molecular evolution for over 10 years. They have both been elected as Associates in the prestigious Program of Evolutionary Biology of the Canadian Institute of Advanced Research, have organized national symposia in the area of molecular evolution, have presented numerous papers on this topic at international meetings, and routinely review primary research publications for journals such as Genetics, J. Molec. Evolution, Molecular Biol. & Evol. and others.

c) Library Resources:

Present library resources, e.g., primary journal sources, review sources, etc., are adequate for this course.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: MBB Department: MBB Course Number: 832-3

Title: Molecular Phylogeny and Evolution

Description: Examination of the basic methods applicable to detailed analyses of molecular phylogeny and evolution including discussions of cladistic vs. distance methods, tree construction and analysis, and the choice of appropriate molecular sequences for analysis of various levels of divergence.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5-12 When will the course first be offered: 95-2

How often will the course be offered: Alternate years

JUSTIFICATION:

Molecular phylogeny and evolution represent important new applications of molecular biology and are a focus of research efforts in the MBB graduate program. A similar course has been offered as a Special Topics course, which will now be formalized and regularly scheduled. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: M.J. Smith and A.T. Beckenbach

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: [Signature] Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHU. JONES Date: 18/1/95

Senate Graduate Studies Committee: [Signature] Date: Jan 18/95

Senate: 60 Date: _____

a) Outline of the Course

MBB 832-3

MOLECULAR PHYLOGENY AND EVOLUTION

The course will consist of faculty lectures and student seminars. Students will be expected to become conversant with the classical and contemporary literature in molecular evolution.

LECTURE/SEMINAR AREAS:

- 1) DNA and protein structure and sequence.
- 2) Sequence alignment algorithms...character weighting and gap penalty assignment.
- 3) Molecular clocks and rate constance hypotheses.
- 4) Mutations, pathways and mechanism of change, transition to transversion pathways, rations, and rates.
- 5) Protein evolution: amino acid changes:
 - Codon families, synonymous versus non-synonymous nucleotide changes;
 - Measures of homology and divergence:
 - PAM and BIOSUM matrices
- 6) Construction of phylogenetic trees and the discernment of descent
 - Cladistic methods...
 - Distance methods...
- 7) Genome structure and characteristics:
 - Organellar genomes
 - Chloroplasts
 - Mitochondrial genomes
 - Nuclear genomes:
 - Repeated sequences, micro- and minisatellites, introns, exons, and genes.
- 8) Methods and approaches:
 - A) Choosing the right macromolecule
 - 1) Ribosomal genes, peptide coding genes, tRNAs, introns, exons, satellites.
 - 2) Mitochondrial, chloroplast, or nuclear genome.
 - B) Methods:
 - 1) PCR, RAPDs, VNTRs, and Fingerprinting;
 - 2) DNA sequencing
 - 3) RFLP analyses
- 9) Introduction to computer methods:
 - A) Computer data bases:
 - e.g., EMBL, GenBank, Protein Data Bases
 - B) Search and alignment algorithms:
 - e.g., FASTA, BLAST

Examples of relevant background texts:

- 1) Bishop, M.J. and C.J. Rawlings (eds.): Nucleic Acid and Protein Sequence Analysis: A Practical Approach. IRL Press, 1987.

- 2) Davies, K.E. (ed.) Genome Analysis: A Practical Approach. IRL Press, 1988.
- 3) Hillis, D.M., and C. Moritz. Molecular Systematics. Sinauer Assoc., 1990.
- 4) Nei, M. Molecular Evolutionary Genetics. Columbia Univ. Press, 1987.
- 5) Li, W-H. and D. Graur. Fundamentals of Molecular Evolution. Sinauer Assoc., 1991.
- 6) Doolittle, R.F. (ed.) Molecular Evolution: Computer Analysis of Protein and Nucleic Acid Sequences. Methods in Enzymology: Vol. 183. Academic Press, 1990.

b) Competence of Faculty:

Both listed faculty have been publishing internationally recognized research in the area of molecular evolution for over 10 years. They have both been elected as Associates in the prestigious Program of Evolutionary Biology of the Canadian Institute of Advanced Research, have organized national symposia in the area of molecular evolution, have presented numerous papers on this topic at international meetings, and routinely review primary research publications for journals such as Genetics, J. Molec. Evolution, Molecular Biol. & Evol. and others.

c) Library Resources:

Present library resources, e.g., primary journal sources, review sources, etc., are adequate for this course.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: _____
Department: MBB Course Number: 833-3

Title: Developmental Genetics

Description: Selected Topics in the Developmental Genetics of Drosophila.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: None

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5-10 When will the course first be offered: 96-1

How often will the course be offered: Once every two years

JUSTIFICATION:

Application of molecular genetic techniques to the development of Drosophila has led to a series of breakthroughs in understanding of development. Developmental genetics is a focus of the MBB graduate program. This course was offered previously as a Special Topics course, which should be formalized and scheduled on a regular basis. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: Dr. James V. Price

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Currently available library resources are sufficient.

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: B. McKearn Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHW. Jones Date: 18/1/95

Senate Graduate Studies Committee: B.P. Cleary Date: Jan 18/95

Senate: 63 Date: _____

Appendix A.

MBB 833

Course Outline

This course will meet two times per week. Each meeting will be approximately 1.5 hours. Original research articles from the current literature will be assigned as required reading. The assigned articles will be discussed during class meetings. Short essays (less than one page) discussing the assigned articles will be required after each class meeting.

Since the course is based on current literature, the specific content will vary. However the course will follow the general progression indicated below.

Weeks 1- 4 *Drosophila* Oogenesis: the establishment of pattern in the egg.

Weeks 5 - 8 *Drosophila* Embryogenesis: interpretation of the maternally imposed pattern and implementation of embryonic cell fates.

Weeks 9 - 12 Neurogenesis and eye development in *Drosophila*.

Week 13 Imaginal disks in *Drosophila* development.

Competence of the Instructor

Dr. Price received graduate training in molecular biology and nucleic acid biochemistry from Nobel Laureate Tom Cech. He then carried out postdoctoral research at Princeton U. on the molecular and developmental genetics of oogenesis and pattern formation in *Drosophila*, the most advanced model of animal development. His research, which has been published in leading journals (e.g., *Science*, *Cell*, *J. Mol. Biol.*), focuses on the subject matter of this course and is funded by NSERC and MRC.

Library resources: This course will not require the acquisition of any new library resources. The course will be based on original research articles from the current literature. The journals that will be useful are already available in the library. The following serials will be used in the course:

Cell
Development
Developmental Biology
Genes and Development
Genetics
EMBO Journal
Nature
Proceeding of the National Academy of Sciences (USA)
Roux's Archive of Developmental Biology
Science

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

PROGRAM: _____
Department: Molecular Biology and Biochemistry Course Number: MBB 834
Title: Topics in Developmental Biology
Description: Consideration of selected contemporary topics including pattern formation, morphogenetic determinants, inductive interactions, and regulation of gene expression.
Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: BISC 303, 321 or equivalent

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5-10 When will the course first be offered: 97-1
How often will the course be offered: In alternating years.

JUSTIFICATION:

Developmental biology is one of the most active disciplines in the biological sciences, and is a focus of the IMBB research programs. This course has been irregularly offered as a special topics course, but should be formalized and offered on a regular basis.
It will be part of the MBB graduate program. Complements MBB 833.

RESOURCES:

Which Faculty member will normally teach the course: Dr. Bruce Brandhorst
What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: B. AM. Krown Date: 12/1/95
Faculty Graduate Studies Committee: _____ Date: _____
Faculty: OTTW. Jones Date: 12/1/95
Senate Graduate Studies Committee: B. P. C. C. Date: Jan 18/95
Senate: 65 Date: _____

MBB 834-3

TOPICS IN DEVELOPMENTAL BIOLOGY

Instructor:

Prof. Bruce P. Brandhorst

Prerequisites:

Students should have the equivalent of BISC 333 (formerly 203), DEVELOPMENTAL BIOLOGY, and BISC 321 INTRODUCTION TO MOLECULAR BIOLOGY. Students uncertain about these prerequisite courses should seek permission of the instructor.

Course format and outline:

This course will consider important contemporary topics in developmental biology, concentrating on the recent literature. The course will consist of lectures and seminars presented by the instructor and students as well as discussions. In addition, some speakers in the IMBB seminar series will be invited to meet with students to discuss their research. The topics will vary from year to year and will evolve with the literature but are likely to include the following:

1. Overview of pattern formation in insects: nature of morphogens and morphogenetic gradients, establishment of axes of polarity, segmentation, and establishment of segment identities.
2. Establishment of axes of polarity in other embryos, especially vertebrates.
3. The nature and role of inductive interactions in various embryos including frogs, ascidians, sea urchins, and nematodes.
4. Analysis of genes involved in cellular determination and differentiation. Examples may include: myogenic transcription factors in vertebrates; the nature and function of genes involved in binary cell fate decisions; and genes involved in sex determination.
5. Regulation of gene expression during embryonic development. Transcriptional regulation in differentiating cells. Several examples of post-transcriptional regulation will be examined, generally in connection with other topics. Mechanisms which result in stable patterns of specialized gene expression will be considered.
6. Developmental mechanisms of evolutionary change.

Readings:

Recent research reports and review articles will be assigned. Useful background reading will be found in the following books:

1. *Developmental Biology*, Scott F. Gilbert. Sinauer. (Fourth edition, 1994).
2. *Developmental Biology*, L.W. Browder, C.A. Erickson, and W.R. Jeffery. Saunders College (Third edition, 1991).
3. *From Egg to Embryo*, J.M.W. Slack. Cambridge Univ. Press (Second edition, 1991).
4. *The Making of a Fly*, Peter A. Lawrence. Blackwell Scientific Publications (1992).
5. *Gene Activity in Early Development*, Eric H. Davidson. Academic Press (Third Edition, 1986).

Evaluation:

Students will be evaluated on the basis of their seminars, several written reports, and participation in discussions. A formal examination may be given.

Competence of the Instructor

Dr. Brandhorst has carried out research on the development of embryos for over 25 years. He publishes in, and reviews manuscripts for, the leading journals in his field (e.g., *Developmental Biology*, *Development*, and *Genes and Development*). He has served on the Editorial Board of *Cell and Molecular Biology* and is Associate Editor of *Molecular Reproduction and Development*. He is currently a member of the NSERC Cell Biology GSC, representing developmental biologists. From 1980-1987 he taught and directed an international graduate training program in developmental biology at the Marine Biological Laboratory, Woods Hole. He taught a similar course at McGill University for 16 years.

Library Resources:

The library has an adequate collection of serials and books related to the topic of the course. Assigned readings will be drawn from these holdings. The Instructor has personal subscriptions to some important serials not included in the Library collection, and will make these available to students.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 835-3
Department: _____

Title: Genome Analysis

Description: The course will consider recent literature. Students will present seminars and carry out projects on computer-based analysis of genomic sequence data. A familiarity with the Unix operating system is essential.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: BISC 402 or equivalent

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5 - 10 When will the course first be offered: 96-2

How often will the course be offered: Every second year

JUSTIFICATION:

Large scale genomic sequencing projects are under way and will produce huge amounts of new information. This course will help students learn to manage that data. It will be part of the MBB graduate program. It is part of the focus on molecular evolution

RESOURCES:

Which Faculty member will normally teach the course: Dr. David L. Baillie

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: BAM: Keown Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHW. Jones Date: 18/1/95

Senate Graduate Studies Committee: BPC Date: Jan 18/95

Senate: 68 Date: _____

a) Course Outline

MBB 835-3

GENOME ANALYSIS

The course will consider recent literature. Students will present seminars and carry out projects on computer-based analysis of genomic sequence data. A familiarity with the Unix operating system is essential.

TOPICS

1. High resolution physical maps of eukaryotic genomes.
 - a. "Philosophical" and practical considerations: refinement of maps prior to DNA sequencing.
 - b. Methods of map construction. Approaches adopted for *S. cerevisiae*, *D. melanogaster*, *C. elegans*, mice and humans.
 - c. Use of Expressed Sequence Tags (ESTs) and Sequence Tagged Sites (STSs).
2. Sequencing genomic DNA
 - a. The relevance and utility of "model" organisms and development of sequencing strategies.
 - b. Methods for handling DNA sequence output (Staden utilities such as XBAP. etc.)
3. Analysis of genomic DNA sequence
 - a. Database searches:
 - i. Algorithms
 - ii. Useful database servers
 - b. Presentation and retrieval of data: e.g., ACeDB.
 - c. Comparative sequence analysis.
 - d. Identification of genes.
4. Exploitation of sequenced genomes.
 - a. How will the information be used by biologists.
 - b. Methodologies and strategies.
 - c. Opportunities for the study of genomic organization, function, and evolution.
5. Complementary approaches: alternate methods for analysis of eukaryotic genomes.

b) Competence of the Instructor

Prof. Baillie was trained as a geneticist at UBC, U. Connecticut, and Cambridge U. His research concerns high resolution mapping of genomes and is supported by NSERC, NIH, the CGAT genome project, and the Muscular Dystrophy Association. Regarded as a leading Canadian geneticist, he has served recently on MRC and NSERC grant selection committees, and is an Associate Editor of *Genome*. Much of his current research is related to the global effort to map and sequence the genome of

C. elegans, a project serving as a model for the massive Human Genome Project. A critical aspect of these projects will be the management and utilization of the data produced, a focus of this course.

c) Library Resources

With the addition of *Nature Genetics*, the leading journal relevant to the course, the serials collection is adequate. On-line databases accessed on the Internet, or databases stored on the IMBB network server, will be used extensively.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: _____
Department: MBB Course Number: 836-3

Title: Gene Expression

Description: A consideration of the mechanisms and regulation of gene expression in eukaryotes and prokaryotes.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: None

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 6-12 When will the course first be offered: -96-3

How often will the course be offered: Every 2 years

JUSTIFICATION:

New MBB graduate program. The topic is the essence of molecular biology. A similar course has been offered previously as a special topics BISC course.

RESOURCES:

Which Faculty member will normally teach the course: Dr. B. Honda

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Adequate.

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: Bramble Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: ATHW. Jones Date: 18/1/95

Senate Graduate Studies Committee: BPCla Date: 9-18/95

Senate: 71 Date: _____

a) **Course Outline**

MBB 836-3

GENE EXPRESSION

- Instructor: Dr. Barry M. Honda
Office: SSB 7140
- Reference material: Genes and Genomes (1991), Singer and Berg, as well as other texts and current journals.
- Course description: This course will use the current literature to survey recent advances in our understanding of how genes are regulated.
- Course outline: Topics to include:
- A review of gene structure
 - An overview of the logic and machinery of gene expression, levels of regulation.
 - Genomic rearrangements and gene activity
 - Transcription as a key regulatory step
 - Post-transcriptional events: RNA processing, stability, etc.
 - Translational regulation
 - Post-translational mechanisms

b) **Instructor competence:**

Trained as a molecular biologist at UBC, Washington U., and MRC (Cambridge), Dr. Honda's research training and current interests concern mechanisms of transcription and the regulation of gene expression in animal cells. His research concerns RNA polymerase III and the structural features of chromosome which influence gene activity. He currently serves on the NSERC Molecular Genetics grant committee. He covers several of the topics at a lower level of sophistication in his courses BISC 321 and 431. He recently offered a similar special topics BISC graduate course.

c) **Library resources:**

The library has copies of Singer and Berg, as well as a modest collection of journals representing this area. With the proximity of the good UBC collection, the library resources are adequate.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program Department: MBB Course Number: 837-3

Title: Molecular Genetics of Signal Transduction

Description: Consideration of mechanisms of signal transduction using molecular genetic approaches with emphasis on the yeast *Saccharomyces cerevisiae*.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: None

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 6-12 When will the course first be offered: 96-1

How often will the course be offered: _____

JUSTIFICATION:

This course will be part of the new graduate program in molecular biology and biochemistry. Cellular signalling/signal transduction is an emphasis of IMBB research and a leading research front. Yeast offers unique advantages for molecular geneticists and biotechnologists. Offered in 94-1 as BISC 861.

RESOURCES:

Which Faculty member will normally teach the course: Dr. Charlie Boone

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes.

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: Bernie Keown Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: ATW. Jones Date: 12/1/95

Senate Graduate Studies Committee: BPC Date: Jan 18/95

Senate: 73 Date: _____

A) Outline of the Course

MBB 837-3

MOLECULAR GENETICS OF SIGNAL TRANSDUCTION

Instructor: Charlie Boone

Course description: Consideration of mechanisms of signal transduction using molecular genetic approaches with emphasis on the yeast *Saccharomyces cerevisiae*.

Course outline: This course will involve a current literature survey of the recent advances in signal transduction with a special emphasis on the yeast *Saccharomyces cerevisiae*.

Topics to include:

G protein-coupled receptors

RAS signaling pathway

Mitotic cell division control

B) Instructor's competence:

Dr. Boone received his graduate training at McGill University in the molecular genetics of yeast, a very important research model of eukaryotic cells. His thesis research was published in several highly selective journals (e.g., *Cell*, *J. Cell Biology*, *Nucleic Acids Research*). He initiated his current research program on signal transduction mechanisms in yeast as a postdoctoral fellow at the Institute of Molecular Biology at the University of Oregon. Since his arrival at SFU he has twice taught this course as a special topics BISC graduate course, which has been well received.

C) Library resources:

The library contains all the journals required.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: Molecular Biology and Biochemistry Course Number: MBB 839-3
Department: _____

Title: Special Topics in Molecular Biology

Description: A detailed consideration of a selected important topics in molecular, cellular, and developmental biology and genetics.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 5-10 When will the course first be offered: TBA

How often will the course be offered: Intermittently, as required.

JUSTIFICATION:

This course provides an opportunity to quickly mount a new graduate course in an emerging research front or in accordance with special opportunities, such as the arrival of a new faculty member. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: TBA

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: B. A. McKinnon Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: CHW. JONES Date: 18/1/95

Senate Graduate Studies Committee: B. P. C. C. Date: Jan 18/95

Senate: 75 Date: _____

MBB 839-3

SPECIAL TOPICS IN MOLECULAR BIOLOGY

Instructor:

To be selected from among the staff of the Graduate Program in Molecular Biology and Biochemistry.

Outline:

A detailed consideration of recent literature concerning important contemporary topics in molecular, cellular, and developmental biology and genetics. Topics will change from year to year, and this course can be taken more than once with permission of the instructor. The topics will not be covered in depth in other MBB graduate course offerings. This course allows an opportunity to quickly provide graduate instruction in newly developing areas of research or in response to special circumstances, such as the presence of a new or visiting faculty member. The instructor(s) will decide on the format of the course, with the approval of the MBB Graduate Program Committee.

Competence of the Instructor:

The course will be offered by an Instructor having research expertise in or specialized knowledge of the topic covered.

Library Resources:

The current books and serials collection is adequate.

SIMON FRASER UNIVERSITY
NEW GRADUATE COURSE PROPOSAL

CALENDAR INFORMATION:

Program: _____
Department: Molecular Biology and Biochemistry Course Number: MBB 871, 872, 873
Title: Directed Readings in Molecular Biology and Biochemistry
Description: Programs of directed readings and critical discussions based on the educational goals of individual students.
Credit Hours: 1, 2, 3, respectively Vector: 0, 2-6, 0 Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 1-3 When will the course first be offered: TBA
How often will the course be offered: Intermittently, as needed.

JUSTIFICATION:

The course is designed to provide a directed educational experience for students when formal graduate courses are not available which cover the subject matter, but there is faculty expertise. It will be part of the MBB graduate program.

RESOURCES:

Which Faculty member will normally teach the course: TBA
What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course

b) An indication of the competence of the Faculty member to give the course.

c) Library resources

Approved: Departmental Graduate Studies Committee: Lynn K. ... R. ... Date: 12/1/95

Faculty Graduate Studies Committee: _____ Date: _____

Faculty: ATH. Jones Date: 18/1/95

Senate Graduate Studies Committee: B. P. C. ... Date: Jan 18/95

Senate: 77 Date: _____

MBB 871-1, MBB 872-2, MBB, 873-3

DIRECTED READINGS IN MOLECULAR BIOLOGY AND BIOCHEMISTRY.

Programs of directed readings and critical discussions offered by staff members to an individual student (or small group of students) to achieve the specific educational goals of the student. A program of reading, discussion, and evaluation will be developed for each course offered. Each study program must be approved by the MBB Graduate Program Committee.

Competence of the Instructor:

Instructors will be selected on the basis of their expertise in the subject matter of the course.

Library Resources:

The resources of the library are adequate. Use of interlibrary loans will permit acquisition of appropriate serials not included in the collection.