ACADEMIC PROGRAM REVIEW

MOLECULAR AND CELLULAR BIOLOGY INTERDISCIPLINARY GRADUATE PROGRAM

The Graduate School, University of Washington
and
Fred Hutchinson Cancer Research Center

Doctor of Philosophy Degree

Last Review: 1999

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TABLE OF CONTENTS

A. REQUIRED BACKGROUND INFORMATION
Section I: Overview of Organization

The Molecular and Cellular Biology (MCB) Interdisciplinary Graduate Program was founded as a joint effort between the University of Washington (UW) and the Fred Hutchinson Cancer Research Center (FHCRC). The program began admitting students in 1987 and became an independent degree-granting program in 1994. There are 141 students and 250 faculty mentors currently in MCB, with 19 new students joining in Autumn 2010. This review marks the second time the program has been evaluated, being last reviewed in 1999.

Section I.A: Mission & Organizational Structure
I.A.1 Overall mission of the MCB program

The MCB program is designed to provide interdisciplinary graduate training in the fields of molecular and cellular biology. The core philosophy of MCB is for students to be actively involved in designing their program of study to meet their individual needs. The program selects motivated and highly capable students with substantial research experience. The program seeks for students to tailor their education through active dialog with faculty, to develop skills commensurate with their future as successful independent scientists.

MCB is comprised of faculty from ten basic science departments (Biochemistry, Biological Structure, Biology, Genome Sciences, Global Health, Immunology, Microbiology, Pathology, Pharmacology, Physiology and Biophysics) in the College of Arts and Sciences, the School of Public Health and the School of Medicine at the UW and from five divisions (Basic Sciences, Clinical Research, Human Biology, Public Health Sciences, Vaccine and Infectious Disease) at the FHCRC. Additional UW faculty are in the Colleges of Engineering and Environment. The program incorporated faculty from the Institute of Systems Biology (ISB) in 2004, and will include faculty from the Seattle Biomedical Research Institute (SBRI) in the 2010/2011 academic year. Covering the breadth and depth of biomedical sciences, the MCB program affords students the opportunity to train in research across departments and institutions. The mission of MCB is to offer training beyond the graduate programs offered by individual departments. Students have the opportunity to select research opportunities in a wide variety of labs and take coursework structured to their individual needs from across program offerings.

The organizational structure of the MCB Program is somewhat unique. An Organization Chart is provided in Appendix A. A Steering Committee overseen by the Program Directors meets twice annually to provide overall direction of this interdisciplinary program. The Steering Committee consists of the two Directors, one from the University of Washington, the other from the FHCRC, several representatives from the FHCRC, a single representative from each of the basic science departments (listed above), and one each from ISB and SBRI.

At the University of Washington, two Schools--the Graduate School and the School of Medicine--share administrative oversight and provide fiscal support. The Graduate School supplies the UW portion of financial support to the MCB Program as one of its many interdisciplinary programs. The administrator of the Graduate School keeps track of fiscal activity in the program and provides the necessary authorizations for MCB staff. The School of Medicine has basic personnel oversight responsibilities for the program, approving new hires. The SOM has provided the office space for MCB in the Health Sciences.

I.A.2 Description of Degree

The goals of training students broadly in modern biology, and fostering their ability to design and critique scientific ventures, are pursued through the basic elements of the program. These include three

quarters of general courses in the first year, a three-quarter literature review course, advanced elective courses, and informal and formal seminars. In addition, students engage in laboratory rotations in each of their first three quarters to broaden their training and to decide on a laboratory in which to pursue their thesis research. Due to the broad nature of the program, the formal course requirements are kept to a minimum to accommodate the different learning objectives of the individual students. MCB students choose from the array of graduate courses offered across the UW and FHCRC. After choosing a laboratory for dissertation research, students continue with their coursework and complete teaching requirements through their second year and complete their general exam during their third year. The final years of the program are dedicated to dissertation research. MCB students are encouraged to complete the program in 5.5 years and are required to petition for extension beyond 7 years.

In addition to research training and intellectual development leading to a Ph.D. degree in MCB, the MCB Program also offers additional programs or degrees that some students pursue as follows:

Summer Biotechnology Externship Program: Many students who receive their scientific graduate training in MCB will seek and find jobs in biotechnology, pharma or medical device industries. Most students entering the MCB program, however, have not been exposed to non-academic research. In response to this need, we have established a student externship program in coordination with several companies in the Puget Sound area. Because of the natural flux within the biotechnology domain, each year some companies drop out of participation and are replaced by others. MCB students are encouraged to apply to participate in this program in the early spring. This Externship is available during the first summer of enrollment to students who have completed 3 rotations and identified a dissertation laboratory. Students are supported by MCB during the externship.

Concurrent Molecular and Cellular Biology (MCB) PhD/ Epidemiology MS Program: This program allows MCB graduate students the opportunity to obtain an M.S. degree in Epidemiology concurrently with their Ph.D. degree. There has been increasing interest in training basic scientists to have a deeper understanding of the growing field of Molecular Epidemiology. The goal of this program is to train scientists who will be well versed in modern epidemiological research methodologies, which should broaden their abilities to obtain positions at academic research institutions as well as in industry. This program involves approximately four additional quarters in graduate school. An NIH interdisciplinary training grant supports students during the year that they take classes for their M.S. degree.

Joint MBA Program: The Master of Business Administration (Joint MBA) Program offered at the UW Bothell campus allows students to pursue a business degree while enrolled in the MCB program. The goal of this program is to provide MCB students with an opportunity to pursue options in industry after their Ph.D. Students participate in this program during their fourth and fifth years. Students are responsible for the additional tuition charged for the MBA degree.

Certificate in Molecular Medicine: The Molecular Medicine Training Program (MMTP) at the University of Washington is designed to train Ph.D. researchers to use advances in basic sciences to solve problems relevant to human disease; and, conversely, to use insights from human disease processes to solve fundamental biological problems. Training in Molecular Medicine incorporates three key elements: case-based courses, clinical exposure, and dual mentorship of Ph.D. research. Students apply to this program after their first year.

1.A.3 MCB Organization and Unit Governance

The MCB program was established in 1994 as a joint program between the UW and FHCRC. Each institution has independent approval from the State of Washington Higher Education Coordinating (HEC) Board to conduct interdisciplinary programs leading to a Ph.D. in Molecular and Cellular Biology (originally Cellular, Molecular and Developmental Biology at FHCRC). The original document establishing the MCB program, from Feb 14 1994, and amendment from 2003, is attached as Appendix

E. The chart showing the organization of MCB is shown in Appendix A. Following the original agreement, the MCB program is overseen by two Directors: one at the UW (currently, David Raible) and one at the FHCRC (currently, Michael Emerman). Dr. Emerman has been Director since 2006, and Dr. Raible since 2007. The Directors make policy decisions, guide and approve each student's program of study, and make final decisions on admissions. Discussion of improvements in the administration across units is addressed in the self-study questions in Part B.

MCB staff consists of 3.5 FTE at UW and one FTE at the FHCRC. Staff also contribute effort to the Cell and Molecular Biology Training Grant. The Program counts approximately 250 interdisciplinary group members from the participating institutions and 160 students in all. Although all the faculty have different home departments, the MCB Program tracks current faculty and adds new ones on a regular basis.

The staff consists of one program manager (Terry Duffey, 1 FTE), one graduate specialist (MaryEllin Robinson, 1 FTE), one program coordinator (Diane Darling, 1 FTE) and one fiscal specialist (Millie Morris, 0.5 FTE), together with a graduate program manager at the FHCRC (Michele Karantsavelos, 1 FTE). Current funding from the Graduate School provides support for the UW staff, while the FHCRC does the same for the graduate program manager in its domain. The staff practice a team approach to major projects, particularly admissions, recruitment, and orientation. There is much cross-training for all staff members, but there is also specialization. The Program Manager and the Fiscal Specialist maintain payroll, contracts, and expenditures for the most part. The Graduate Specialist and the Program Coordinator handle student and applicant advising and processing. The Graduate Specialist and the Program Manager attend the minority recruitment conferences in the national arena.
The Graduate Program Manager at FHCRC interfaces with the UW staff on program concerns and is a liaison for students on the FHCRC campus. Staff meetings are set up whenever the need arises to address a larger project. Every Friday late morning the UW Director visits the MCB Office for an informal meeting to discuss current priorities and student problems. Periodic individual staff reviews are held by supervisors, whether the Program Directors or the Program Manager. All in all, this has led to an efficient, hard-working and enthusiastic staff team.

The MCB Steering Committee serves to provide guidance and oversight to the Directors (see Appendix C for members and CVs). The Steering Committee approves major changes in policy and curriculum, and evaluates and votes on faculty appointments. The committee is composed of Chairs of affiliated UW departments or their representatives, four representatives from the FHCRC, a representative of ISB and beginning in the 2010-2011 academic year a representative from SBRI. In addition, the Steering Committee has two student representatives, who participate in discussion but are excluded from evaluation of faculty appointment. The Steering Committee meets twice yearly, in Autumn and Spring quarter. In addition the committee is polled by email for judgment on issues that do not require extensive discussion.

MCB is administered under the UW Graduate School, headed by Vice Provost and Dean Gerald Baldasty. James Antony, Associate Vice Provost and Associate Dean for Academic Affairs, oversees interdisciplinary programs including MCB. As the MCB program includes students and faculty across UW and other institutions, the Graduate School is the logical place for it to be housed.

Section I.B: Budget & Resources

I.B.1 Unit Budget

The MCB budget covers the cost of recruiting and training students to receive an interdisciplinary Ph.D. in Molecular and Cellular Biology. MCB students are supported by the program for their first year, after which they are supported by their dissertation laboratory. Upon entering a laboratory, the student's mentor completes the MCB contract letter (Appendix F), which stipulates that the student will be financially supported as long as he or she is a student in good standing. The contract letter is signed by the mentor's department or division chair, confirming support in the case of mentor funding difficulty.

The budget summary in Appendix B outlines the annual expenditures (over three biennium) broken into gross categories. Two-thirds of the budget goes towards Student Support, 20% towards Staff Support, and the remainder is distributed across a number of smaller categories. The Student Support category accounts for the overall cost to support the incoming class in research assistantship positions while they pursue three to four rotations in different labs. The number of students has varied from 20-28 students over the past 6 years, with an average of 24 students supported per year. Students are supported at a rate of $2279/month for 2010/2011, with an additional 14.7% benefits including health care coverage, a rate that is set across the School of Medicine graduate programs. Tuition is also covered. The Recruitment Visits category includes the cost of two visits, usually in February, of 30-35 recruits at each. This category includes the cost of domestic airfare, hotel, food, and entertainment. The Publicity category accounts for minority recruitment outreach at various conferences, recruitment materials, and Web page development. The Symposium is scheduled approximately every year-and-a-half and is arranged by the MCB students; it includes airfare, hotel, and, miscellaneous. The Student Workshops encompasses student travel to conferences. Each student is allocated $2,000 when they enter the MCB Program to use toward participation in scientific conferences over the course of their graduate career. Classroom Expenses' main expenditure is towards a new PC or MAC for each incoming student. Operations covers the day-to-day costs of maintaining the main MCB Office in T466 of the Health Sciences, while Staff Support includes a percentage of each staff members' time, whether at the UW or at the FHCRC. The staff effort is not considered 100% because every year those at the UW contribute significant time to maintaining the Cell and Molecular Biology Training Grant, with 31 trainees one of the largest of this type of training grants supported by NIH. The staff member at the FHCRC likewise has other responsibilities beyond the MCB Program that demand her attention.
The Molecular & Cellular Biology fiscal outline is a complex matter due to contributions from the University of Washington (UW) and the three contributing external institutions, the Fred Hutchinson Cancer Research Center (FHCRC), the Institute for Systems Biology (ISB) and the Seattle Biomedical Research Institute (SBRI).

Because the UW and the FHCRC were the original partners in establishing the MCB Program, the documents used to project and account for expenditures were designed for and by these two institutions. The Graduate School provides the UW share of costs as it is the "college" housing all interdisciplinary programs. Proportionate division of revised annual costs is calculated as the percentage of MCB students in permanent labs at the FHCRC out of all second year and beyond MCB students. For the 2009-10 academic year, 59 MCB students were based at the FHCRC out of a total of 112 second-year and beyond students. The students' permanent labs are counted at the beginning of Winter Quarter in the prior academic year to assess the percentage of contribution for the coming academic year—in this case 53%. With the addition of ISB and SBRI to the program, their contributions are accounted for as deductions from the overall annual costs. This revised total is then divided proportionately between the UW (the Graduate School) and the FHCRC.

ISB and SBRI make a minimum contribution to the program that will be adjusted as the proportion of MCB students at these institutions increases. The minimum contribution is set at the dollar equivalent of one, twelve-month Research Assistantship at biomedical programs salary level. This is calculated as twelve months of salary (currently $2279/month), benefits (12.9% of salary) and tuition (Summer through Spring Quarter total). In addition, each institution has a different indirect cost rate added to its total, set by agreement with UW. As each institution increases the number of students in permanent labs, this contribution level will increase to a proportion of overall costs. This proportion will be computed in the same manner as the percentage for FHCRC's share described above, as the proportion of total MCB students at each institution. The trigger for this change from minimum to proportionate contribution is activated when the proportionate share is greater than the minimum of the twelve-month research assistantship, currently 5 students. Agreements between MCB and these institutions are found in Appendices F and G.

I.B.2 Evaluation of Financial Resources

The MCB Program is fortunate to have adequate support from its institutional components to cover support for first-year students' salary, benefits and tuition together with all other operational costs. As described elsewhere, the UW and FHCRC administrative staff draw up a projected budget for the coming academic year, deduct contributions from ISB and SBRI, and then divide the remaining total proportionately. The FHCRC contributes that percentage calculated when comparing the number of MCB students in permanent labs at the FHCRC with the total number of students in permanent labs. At some point it is believed that either or both ISB and SBRI will also be assessed a percentage of overall operating costs, beyond the current minimum equivalent to one, twelve-month research assistantship (at PDRA2 basic sciences level, including benefits and tuition). For each institution there are separate methods of calculating when the threshold is crossed, requiring an increase in the institutional contribution. In other words, at some point both ISB and SBRI may be paying a proportionate share of the projected annual budget, calculated by the number of students in permanent labs at each institution.

I.B.3 Financial Development Plan

The MCB Program has undertaken new approaches to secure additional funds for the program. First, we have established working relationships with two additional institutions, ISB and SBRI. These institutions contribute in addition to UW and FHCRC, thus stabilizing out funding for incoming students. We propose to develop a similar plan with Benaroya Research Institute in the coming year. Approximately two years ago the MCB Program began to solicit contributions to endow the Molecular and Cellular Biology Fellowship Fund through the University of Washington Foundation. Faculty took advantage of matching funds to commit a total of $22,700. As this is an endowment fund, we are limited to the amount generated beyond principal to use for student programs. We look forward to soliciting contributions from alumni in the near future. The MCB web page is being redesigned to include individual records for program alumni as a mechanism to more easily keep in contact with former students and follow their career trajectories. We hope that this will also provide an opportunity to solicit contributions from former students when they are further along in their career path.

Section II: Teaching & Learning

II.A Student Learning Goals and Outcomes

II.A.1 Student learning goals

MCB students take a number of courses and perform lab rotations before choosing a dissertation laboratory to complete their training. During the first year, each MCB student must complete three lab rotations with an option of a fourth rotation. These rotations give the student the opportunity to select a lab, which includes contact with several research groups. At the completion of each rotation the student and faculty must write a rotation report about the results of the quarter's rotation. At the end of Autumn and Winter Quarters each student must give a ten-minute rotation talk about the quarter's lab rotation and at the end of spring quarter, a poster presentation.

Due to the broad nature of the program, the formal course requirements are kept to a minimum to accommodate the different learning objectives of the individual students. These include the Conjoint (CONJ) series of courses: 5-week, 1.5 credit courses that are designed to teach general principles through in-depth analysis of specific biomedical subjects. The approved graded courses that MCB students take are offered through the FHCRC and participating departments at the University of Washington (Biochemistry, Biology, Environmental Health, Genome Sciences, Immunology, Microbiology, Neurobiology & Behavior, Pathobiology, Pathology, Physiology & Biophysics and Pharmacology). The Directors may approve a course outside of the participating departments if a student is able to show how the class pertains to her research. Discussion of issues related to course offerings is found the self-study section in part B.

MCB students complete 21 graded credits of coursework with 9 credits of the CONJ series and 12 credits of graded elective courses. MSTP students receiving a PhD through the MCB Program are required to have 18 graded credits with 9 credits of the CONJ series and 9 credits of graded elective courses. Students are further required to attend three lectures and one discussion of the Biomedical Research Integrity Program.

The MCB General Exam is the major evaluation of student performance and is described in detail below. The General Exam must be completed by the end of Winter Quarter of the student's third year. To be eligible to take the General Exam, the student must have completed 18 graded credits of course work. After the General Exam, students will complete any remaining required credits, and attention is now devoted to dissertation research. Yearly committee meetings are held to discuss their progress, and students continue to receive advising from the Supervisory Committee until the dissertation defense.

Students are encouraged to complete their PhDs in five and a half years. The MCB Program has a seven-year limit on the time to degree. In Winter Quarter of the seventh year, the student is informed that he will be placed on probation starting Spring Quarter, but can petition the Directors to hold off on probation. The petition must declare that the student intends to graduate within the next two quarters (i.e., by the end of Summer Quarter), or ask for an extension beyond seven years with evidence of progress towards degree. This petition must include an email indicating support (or no support) from each member of his or her Supervisory Committee. It must be submitted to the Directors by the end of the fifth week of Winter Quarter, together with the supporting emails from the Supervisory Committee. The Directors reply to the student's petition, giving their decision by the beginning of Spring Quarter. If the student's petition is denied by the Directors, the student will be placed on Final Probation for Summer Quarter, and will have until the end of that quarter to graduate. If the student does not complete all the requirements for graduation by the end of this same Summer Quarter, the Graduate School will automatically remove them from UW enrollment.

All MCB students must write a dissertation and present an oral defense to receive their Ph.D. Three Supervisory Committee members are chosen to be on the student's Reading Committee. The dissertation must be read, and the Reading Committee must agree that the student will complete the dissertation by the required deadline before the oral defense can be scheduled with the Graduate School. The final examination is presented to the public with questions directly after the presentation. The Supervisory Committee questions the student in a closed meeting oral presentation. Corrections to the dissertation must be completed within 60 days of the final exam or by the end of the quarter.

II.A.2 Student evaluation

The Doctoral Supervisory Committee forms the basic unit assuring academic rigor and progress. A major responsibility of the student's Doctoral Supervisory Committee is to advise students of additional courses that would provide essential background information in their chosen area of research beyond the program requirements. In addition, the Doctoral Supervisory Committee administers the student's general and final exam. The Supervisory Committee must have a minimum of five members, constituted as follows: one Chair (the student's dissertation advisor), two MCB faculty members, one non-MCB member (or another MCB faculty member), and one Graduate School Representative (GSR). The GSR is a voting member of the committee. The GSR cannot (a) be in the same department as the chair, (b) have an adjunct appointment in the same department as the chair or (c) be an affiliate UW faculty member. The GSR must attest to the validity of examinations (General Exam and Final Exam), indicating approval of the process by which examinations were conducted. This is done by signing the warrant and by submitting a standardized report on the examination process to the Dean of the Graduate School.

During the second year students select a supervisory committee and have an initial meeting by the end of June. An annual committee meeting must take place each year by the end of June with a written report turned into the MCB Office within a week after the meeting. Once a year a report is given to the Directors informing them of students who have not met Program requirements. The Directors follow up with these students to insure that each is progressing and meets the MCB requirements before the beginning of Autumn Quarter.

Students must pass the MCB General Exam to advance to candidacy for the Ph.D. The exam must be taken before the end of Winter quarter of the third year. The format of the exam is a written document outlining the student's dissertation proposal with an oral defense. The exam is intended to rigorously test and evaluate a student's broad command of concepts, background, ideas and hypotheses surrounding his/her research field, as well as his or her command and defense of possible experimental strategies to address central questions in that field. The ability to clearly articulate well-crafted hypotheses, and/or to describe how a 'discovery' based project would lead to the development of novel research directions and goals, is a key component of the exam. The committee may pass the student, allow the student to conditionally pass subject to additional information, or require the student to re-take the exam. The committee may also recommend additional coursework subject to the exam's outcome.

All MCB students must complete a written dissertation and oral defense to receive their Ph.D. degree. The dissertation is expected to be a substantial scholarly work, and may include published manuscripts as chapters. A reading committee of three committee members is established to examine and approve the written dissertation. The final examination consists of a public presentation of dissertation work with questions open from the audience followed by closed questioning by the dissertation committee. Corrections to the dissertation must be completed 60 days after the exam.

II.A.3 Student satisfaction

Students have a number of opportunities to report their satisfaction with the MCB Program. Each year in June the Directors meet with the first-year MCB students to review how the year went and how the Program could be improved. The two student representatives on the MCB Steering Committee provide a second mechanism for assessing student satisfaction. These students are empowered to give student opinion on issues related to MCB governance. Student representatives collect feedback from students at the MCB student retreat held each spring and convey these to the MCB Directors. Finally, the opinion of each graduate is sought. At completion of their degree, each student is polled for opinion and feedback about how to improve the program. As this exit poll is conducted after completion of the degree, candid opinion is solicited.

There have been excellent ideas that come from these meetings that are incorporated into the program. The comments deal with classes, improvements in TA options, ideas for starting an on-line newspaper to improving the web site, etc. Many of the suggestions are incorporated into the operations of the Program.

II.B. Instructional Effectiveness and Training

Experience in teaching is a central component of the MCB program. To provide students with practical teaching experience, each student serves as a Teaching Assistant for two quarters. The TA experience typically involves one course in which the TA manages a formal quiz section, and a second course in which the TA manages a laboratory section. Courses with TA responsibilities limited to test grading and office hours are not accepted as meeting the TA requirement.

As an alternative for one of the TA requirements, students may elect to participate in one of the formal out-reach programs in Seattle that will expose them to teaching science to people other than undergraduates. The MCB program has a list of programs that have been approved by the Directors. The Science Education Partnership (SEP) program administered through the Fred Hutchinson Cancer

Research Center is the largest of these. This program gives secondary school science teachers hands-on research experience through one-on-one pairing with a scientist-mentor. MCB students who participate in this program develop curriculum. Additional alternative teaching experiences include the BioQuest program run by SBRI in which high school students are given lab-based instruction during two week "summer camps" and the Portal-to-the-Public program run by the Pacific Science Center in which MCB students make presentations about exhibits to the general public. Each of these "alternative" TA experiences also includes a mentoring component.

A list of approved courses is maintained in the MCB Office. The MCB Program schedules a TA Information Session near the end of Spring Quarter for all the first-year students. A representative faculty member (usually from the Biology Department), an SEP representative, and the MCB student coordinator of alternative teaching experiences are invited to speak during the session. Because achieving a diverse teaching experience is considered an important aspect of training in the MCB program, after reading the TA opportunities in the MCB office, students may wish to meet directly with course directors to discuss the course prior to agreeing to serve as TAs. The student makes these arrangements directly with the course instructor. Students submit their choices for TA opportunities to the Program Manager, and they are placed so as to best match their choices.

Students are required to select at least one "academic" course for TA experience in addition to any alternate teaching experience. MSTP/MCB students will complete one regular academic TA during their second year in the MCB Program. All MCB students are required to attend the Annual TA Conference on Teaching and Learning, held on one day in mid-September, before beginning their teaching. This conference will take priority over any other Autumn Quarter events (e.g., departmental retreats) scheduled during the same interval. International students are required to demonstrate proficiency in English before beginning their teaching.

II.C Teaching and Mentoring Outside the Classroom

II.C.1 Faculty involvement outside of classroom

Most student interactions with Faculty occur outside of the classroom. The MCB Directors are the academic advisors for first-year students. Students meet with one of the Directors to discuss lab selections and course options during the first year. The Directors are also available to discuss progress anytime during the student's academic career. Primary advising transfers to the dissertation mentor once a student chooses a permanent laboratory. Each student has numerous weekly interactions with their faculty advisor, and holds a meeting with his/her dissertation committee at least once a year.

II.C.2 Recruitment of students

The MCB program is interested in recruiting students who are determined to pursue a long-term career in biological research and education, either in academia or industry. We consider any and all indicators of future success, including (in random order) past research experience, the level of enthusiasm and detail in letters of recommendation, undergraduate records, performance on standardized tests, an ability to discuss research and future goals during an interview, and the applicant's written statement of purpose. By considering these variables without a preset formula, our admissions committee can select students who will succeed in our challenging interdisciplinary program.

We are listed in the Peterson's Graduate Guide annually, both the print and on line versions (Appendix G), and we receive over 300 applications annually. The deadline for domestic applications is December 1st; international applications are due November 1st. The program goal is to welcome a class of approximately 20-26 students starting fall quarter annually. Applicants must have completed a baccalaureate or advanced degree by the time of matriculation; degrees emphasizing biology, physical or natural sciences, and mathematics are preferred. The application is completed on line through the UW Graduate School and includes a statement of purpose, GRE test scores, three letters of recommendation, and college transcripts. The Directors of the program review all complete

applications, selecting approximately the top 50%, to forward to an admissions committee of 4 faculty, 2 from the UW and 2 from FHCRC. This committee selects the approximate 70 applicants who are extended invitations to interview for the program. On average one third of the accepted candidates join our program.

The MCB staff attends various on-campus events such as the Amgen scholars outreach event and a professional careers day. The MCB program is participating in a community college student's information session, coordinated by the BMR Task Force. This will also welcome UW undergrads. Though the primary goal of these outreach efforts is to connect with underrepresented minorities, it is an opportunity for many majority culture and international students to learn about our unique program. In addition, interviews with current MCB graduate students are regularly shown on UW TV, promoting our program indirectly.

The MCB staff developed attractive and varied promotional materials, including a one-page flier with a detailed description of the program, and how to apply.
(Appendix H).

II.C.2.a Recruitment of underrepresented minorities

The recruitment and retention of students from diverse backgrounds is a high priority for the MCB program. For the past ten years the MCB Program has gone to great lengths to increase its representation of URM students. The staff, students and more recently faculty have become engaged in attending national and local conferences that focus on underrepresented minorities. The MCB Program cooperates with approximately ten other UW biomedical departments in presenting information on graduate education at three or more national conferences each year: ABRCMS (Annual Biomedical Research Conference for Minority Students), AISES (American Indians in Science and Engineering), SACNAS (Society for the Advancement of Chicanos and Native Americans in Science), HBCU-UP (Historically Black Colleges and Universities Undergraduate Program). Students accompany staff to assist in describing to conference attendees the strengths of each program. Starting in 2008, departments associated with MCB committed to a plan to increase minority recruitment through faculty efforts. In an initiative started by MCB and the CMB training grant, each department has committed to send faculty members to minority science conferences. In addition they committed to bring faculty from institutions with large populations of underrepresented minorities to UW, in order to make contacts with advisors of future graduate students. Both of these efforts were also designed to promote underrepresented student issues amongst faculty.

In addition, MCB has invested in efforts to increase over the long term the number of minority applicants. Each summer the MCB Program collaborates with other biomedical institutions in Seattle to host a group of summer interns. These students are recent high school graduates who have participated over the past several years in the Distance Learning Program administered by Dr. Moses Williams. MCB faculty are urged to mentor an intern for approximately two months during the summer. The MCB Program hosts an orientation, a faculty career luncheon, and a poster session. This year the poster session is being held in conjunction with the UW GenOM Project, ALVA Summer Research Program.

The MCB Program strives to take advantage of institutional incentives available to increase URM acceptance of admission offers. For example, UW ARCS (Achievement Awards for College Scientists) offers competitive fellowships to enhance an offer of admission to URM applicants. The MCB Program Director nominates and provides a supporting argument for each URM applicant he wishes to put forward. These fellowships have proved very useful in garnering new minority admissions to the MCB Program. UW GO-MAP (Graduate Opportunities and Minority Achievement Program) also offers fellowships for incoming and current URM graduate students that make for fine recruitment and retention tools. In the past three years, the MCB program has successfully obtained six competitive Diversity ARCS awards, which helped successfully recruit four students.

These efforts have resulted in significant increases in minority students joining MCB (see Appendix I). When comparing the past 5 years (2006-2010) to the 5 years before (2001-2005), there is an increase in all categories: applications (from 5.5% to 6.7%), invited for interviews (from 6.5% to 14.8%), and offers (from 3.9% to 13%). The offer rate is slightly lower than the interview rate since some students turn us down before interviewing. We have had an acceptance rate of 40% that has not changed over the past 10 years. Overall this means we have seen a substantial increase in underrepresented minority students entering MCB.

We have also focused on retaining students once they enroll in the program. Retention rates have been good with only the occasional departure. We have had three of 25 minority students leave the program before obtaining a Ph.D., comparable to our overall rate of attrition. One part of our success has been our association with the SACNAS chapter at the University of Washington. This group has played an important role in providing a community for underrepresented students, and is very active in recruiting. We were pleased that it won a Chapter of the Year award in 2009.

While we have increased success in recruitment and retention, more needs to be done. It might be worthwhile for MCB to identify smaller conferences on a national or regional level. The objective here is to reach African-American undergraduates in a closer context than ABRCMS, a huge national conference. Until recently MCB was attending the HBCU-UP conference, which served this need, but funding was pulled from this organization and the annual conference has been cancelled for 2010. MCB plans on increasing the number of African-American competitive applicants by one-on-one contact in a smaller venue.

Also, there are a number of underrepresented students attending the University of Washington. These undergraduates are as interested in graduate education as those attending the national conferences. The MCB Program endeavors to attend activities on the UW campus that interact with the general (and hence URM) student population, for example the Health Graduate and Professional School Fair that takes place in April. Another event is the McNair Scholars Program that hosts an annual conference in the spring. Participants include URM undergraduates from various colleges and universities in STEM fields (as well as social sciences). Aspiring to graduate education, these students present an optimal group to contact while visiting the main UW campus. A similar event is the Information Session organized by the Biomedical Minority Recruitment Task Force. The BMR Task Force is a committee of staff representatives from each biomedical research graduate program on the Seattle campus. Annually this group invites science students from the local community colleges for a half-day event. Activities include a tour of campus, a forum on student experiences transferring from a community college to a large university, a lab demonstration, and conclude with information tables set up for each of the ten biomedical programs.

II.C.3 Efforts for assurance of academic progress

Assessment of student progress is overseen by the faculty mentor and doctoral supervisory committee. Students are required to hold annual committee meetings and submit written progress reports before June 30 of each year. At the annual committee meeting students will present their work and discuss future plans. Additional committee meetings are assembled as needed. The MCB Program encourages students to finish their Ph.D. in 5.5 years. The Program has recently instituted a seven-year limit on the time to receive a degree, subject to petition to the Directors.

II.C.4 Career preparation

The MCB Program as an interdisciplinary program encourages students from the beginning to prepare for future directions. MCB students can do a Biotechnology Internship during the summer following their first year, and the program facilitates an opportunity to earn an MBA after their 4th year while

continuing with their thesis research. The option of earning a masters degree in Epidemiology in conjunction with the Ph. D. or a certification in Molecular Medicine further broadens the training environment for our students. MCB students are required to do two teaching assistantships, including the innovative SEP and community outreach programs, and have additional venue options to gain teaching experience while pursuing their Ph.D.s. These opportunities contribute to student's preparedness for the next stage of their careers.

Both the UW and FHCRC have a multitude of groups promoting career development, providing information for preparation and exposure to job opportunities, locally, nationally and internationally.

The UW *Career Center* provides support for graduate students preparing for the next step. Including: Workshops and Events Calendar; employer profiles, job postings
http://careers.washington.edu/

UW Bioscience Careers Seminar Series
Bioscience Careers is an interdepartmental, graduate student run organization which provides career information through a monthly seminar series and website. The MCB program is one of the sponsors of this series. The purpose is to educate graduate students and postdoctoral fellows about career options. Since inception in October of 2000, the student-initiated and organized seminar series has hosted speakers representing many different scientific careers. The website provides a direct link to the research journal Science's *Next Wave*, a career development site. *Next Wave* provides the tools, insight, and advice needed to discover the vast range of careers available in academia, industry, and elsewhere, covering issues of scientific training and career development.
http://courses.washington.edu/phd/

Office of Postdoctoral Affairs
This site lists postdoc info including: job opportunities; funding sources; workshops; interesting articles and perspectives. http://depts.washington.edu/pdafrs

The FHCRC *Student/Postdoc Advisory Committee* (SPAC) regularly advertises employment opportunities for postdoctoral positions. Students are emailed information several times weekly. Fliers advertising postdoctoral positions are also on bulletin boards around campus. SPAC offers various seminars and workshops during a graduate student's career providing information useful in securing graduation. http://www.fhcrc.org/science/education/grad_postdoc/spac/index.html

FHCRC *Office of Scientific Career Development*
The Office of Scientific Career Development assists graduate students, postdoctoral fellows, and medical fellows identify and achieve their career goals. This office, working closely with SPAC, is also focused on helping graduate students, postdoctoral and medical fellows develop aspects of the core competencies of a successful scientist.
The office provides information on Professional Development Training and Resources, Career Counseling for Scientists, and maintains a comprehensive listing of job websites.
http://www.fhcrc.org/science/education/grad_postdoc/oscd/index.html

Local scientific groups, such as the Washington Biotechnology and Biomedical Association, encourage graduate student membership and provide networking opportunities for potential jobs in sciences.

Section III: Scholarly Impact

The MCB program is highly successful. The vast majority of our students graduate with a Ph.D. degree (Appendix J). Over 90% of MCB students are using their training in their chosen careers, including students who obtained Master's degrees (Appendix K; Appendix L). Over 70% of graduates are in an academic setting. with over 10% of our students holding faculty positions at institutions including UCSF,

Stanford, Berkeley and Duke. A large percentage of our graduates, 35%, are currently in postdoctoral positions. Others, particularly MSTP students, are continuing their education and pursuing an additional degree. Over 10% of our students are pursuing careers in biotech industry. Others have entered patent law, become involved in science policy, or are pursuing careers in medicine or science writing.
The quality of student effort is also high. Since the program has started in 1992, we have conferred 221 Ph.D.s with an average time of 5.7 years to completion. Of the 224 students that have entered the program since 2001, 37% have already received Ph.D.s, 55% are still enrolled and 8% have left the program, with about half of these students receiving Masters degrees (Appendix P). Students receiving Ph.D's have been very productive. Since 2003, students have published an average of 3.2 papers related to their dissertation. These include publications in top journals such as Nature, Science and Cell.

The quality of student effort is reflected in awards and honors bestowed on students (Appendix M). MCB students have received 80 awards since 2001, with a peak of 16 awards coming in 2010. These include 14 Achievement Rewards for College Scientists (ARCS) fellowships, including 3 Diversity ARCS awards, 7 Harold M. Weintraub Graduate Student awards for outstanding achievement, 9 NIH NRSA predoctoral fellowships and 36 NSF graduate fellowships.

Section IV: Future Directions

IV.A Need for Life Sciences Ph.D.s

There is continuing demand for Ph.D. students in life sciences. A study released in 2010 by Batelle (www.bio.org) indicated that strong growth continues in biosciences, even during the first year of the recession, dramatically outpacing the overall growth rate. This is particularly true for the State of Washington, where biosciences grew from 2001-2008 at a rate of 28.3% compared to 13.8% overall in the private sector. Importantly, the academic sector plays a critical part in WA State, accounting for over 60% research and development expenditure.

As outlined in the State and Regional Needs Assessment report by the WA State Higher Education Coordinating Board (rev. 2006), demand for Life Sciences Ph.D.'s outpaces the numbers of degrees awarded. This gap is predicted to increase based on growth in the sector compared to relatively flat growth in life sciences degrees awarded.

IV.B Direction of MCB

Our long-term goal is to become the premier Molecular and Cellular Biology program in the country. To do so, we would like to attract the best students to our program and have our graduates achieve highest success in their field after receiving their Ph.D. We compete for top quality students but often lose out to Berkeley, Stanford, Harvard or UCSF. We have three overall areas where improvements would allow us to meet that goal: program improvements, student recruiting and student performance.

Program Improvements

We envision several places for improvements in the program.

- Improve cohesiveness of faculty and students. We plan to expand the newly developed Areas of Interest as foci for faculty and student interests. We discuss this further in Part B.
- Increase the participation of our faculty. We would like to improve the involvement of our stakeholders. We discuss this further in Part B.
- Improve the breadth of courses offered to our students. All of our students take six Conjoint classes as part of their core course requirements. However, there has not been a systematic attempt to make sure Conjoint classes span the breadth of interests of students. We discuss this further in Part B.
- Support recruitment of top-quality new faculty.

Increase admission of top students

A second way to improve the MCB program would be increase admission of top quality students. We already have a very good pool of applicants. For example, last year almost 200 of our applicants had a GPA of 3.5 or over. However we would like to improve our representation from top undergraduate institutions. Several steps could be undertaken to improve our visibility:

- establish contacts at top small liberal arts colleges. The University of Washington and FHCRC are well known at tier 1 research universities, but may be less well known at smaller colleges.
- use some of the material we have developed for URM recruiting to make our program more widely known
- require that our students list their affiliation with the MCB program on all publications

Improve student performance

The third way to improve the program is to work to improve the success of currently enrolled students. We are pleased that over 90% of our graduates are still using their Ph.D. training in their careers. However, we would like to increase the effectiveness of our students' graduate education by taking steps to help students publish their research and graduate in a more timely fashion.

- Make expectations clearer. We expect students will have a primary publication by the end of their 4th year, and finish the program with substantial contribution to at least two or more papers. We encourage students to graduate in 5.5 years. We have implemented deadlines requiring students to complete their degree by the end of their 7th year.

- Move up the General Exam to be completed by the end of Autumn quarter in the third year. The General Exam allows students to think deeply about their project, both planning specific aims for their proposed dissertation project and mastering the background and significance of their proposed work.
- Use the Annual Committee Report as a tool to help students work towards publication. We currently require annual committee meetings to make sure students are making adequate progress. Committee Reports could serve as more explicit milestones for progress and encourage writing. We envision that the report would be a more in-depth summary of their work, including figures. Students could expand on past reports to help develop training grant or other funding applications and publications. We propose to make Annual Reports available to students, advisors and committee members via the MCB web site with appropriate access controls.

IV.C Benefit and Impact of Unit

The success of the MCB program has had significant benefits for the University and the greater community. Foremost, we have had a high success rate in producing productive graduates. Over 90% of enrolled students graduate with a Ph.D. Furthermore, the vast majority of our graduates are still making use of their degree in academics and industry. The program is well regarded nationally and internationally, and is reflected in the high quality of the applicants we receive.

In addition to the success of our graduates, the program has several additional benefits for the University, the community and the state. MCB students are productive members of their dissertation laboratories, helping contribute to a research effort that brings in over $30M in grant money to UW and $43M to the FHCRC. Such activity clearly benefits the region and state economically.

MCB also promotes active interactions amongst institutions. The program is unique in that it has members from four different research institutions in Seattle. Likewise it promotes interactions across schools within UW, including the School of Medicine, Arts and Sciences, Engineering, Environment and Public Health. MCB also provides a forum for researchers to interact. A poll (with 168 respondents) recorded faculty interactions with an average of 13.4 other MCB faculty. Such interactions included joint publications, shared students, combined group meetings, shared grants or other collaborations.

B. SELF STUDY QUESTIONS

1. What does the MCB Program expect from its member faculty?

One of the strengths of the MCB program is its wide breadth of faculty in many departments at the UW and at different institutes in Seattle. Indeed, our current studies are widely distributed in different departments, divisions, and institutes (see graph 1 that shows distribution across depts./divisions, Appendix N). However, this does lead to some problems as well in terms of expectations of faculty commitments to the MCB program. As shown in graph 2 (Appendix N), of our 250 faculty members, 163 of them (65%) do not have a current MCB student in their lab, and of those that do, the majority (63%) have only one student. The longer-term distribution of students is also very non-uniform in that 45% of our faculty have never had a student, while fully 40% of all of our previous and present students (N = 345) have been mentored by the 20 faculty who have had 5 or more students since the inception of MCB. Thus, one problem in obtaining faculty involvement for MCB activities our problem is that most MCB faculty members are not highly invested in the program, and most of the work for MCB comes from the much smaller proportion of faculty who have multiple students. While this seems fair, we see expanding the participation of additional faculty in MCB as a mechanism of better distributing students, and expanding the learning opportunities to MCB students.

The MCB program has not yet devised a minimum set of expectations that we expect from each faculty member. In particular, the teaching requirements of MCB faculty have not been defined. This has worked well in the past because faculty have volunteered to teach courses that MCB students take, and MCB students take courses in many departments (see Table 1). However, because MCB has little authority over courses, there are sometimes holes in the schedule due to course cancellations and some subjects are not covered that we would like to see covered. For these reasons, we would like to see a minimum amount of teaching be made explicit as a requirement for continuation of a faculty member as a part of the MCB program. We plan to work with the steering committee to get a reasonable teaching expectation for all MCB faculty that would involve a certain minimum number of lecture hours in a 3-year period.

Additional expectations for MCB faculty member beyond teaching, will include faculty participation in MCB recruitment each year, service on one of the MCB committees (admissions, recruitment, the newly formed Areas of Interest leadership committees) at least once every 5 years, and a requirement for faculty to update their MCB web pages on a yearly basis. These expectations need to be communicated to the faculty.

The large number of faculty that are members of the program is one of its strengths since it allows students to develop research programs across disciplines. The number of faculty has grown since 2001, from 165 to 250; however, inactive faculty are reluctant to withdraw from the program, with the only withdrawals due to moves to different institutions or retirement.

2. How can MCB improve administration across institutions?

One of the challenges of administering an interdisciplinary program across institutions is coordinating efforts with units that have different policies in place. In addition agreements between MCB and different institutions are varied, dependent upon the date at which each agreement was initiated. The agreement with SBRI is the most complete, having been finished in August 2010 (Appendix O). The ISB agreement dating from 2004 is less detailed (Appendix P). The agreement between the UW and the FHCRC that governs the joint administration of the MCB Program was written in 1994 and appended in 2003 (Appendix E). At the moment there are no set mechanisms by which such agreements are reviewed. However the time it takes to initiate the formation of agreements is a significant barrier for moving forward. The agreement between UW and SBRI took almost two years to complete, with MCB acting as a minor player in negotiations.

We propose that the agreements between minor partners in MCB, particularly SBRI and ISB be updated so that they are in alignment. Furthermore, we propose that such agreements should be reached with faculty at other institutions. We have four faculty members who are at Benaroya Research Institute, although none currently have MCB students. We recommend that an agreement be reached with Benaroya modeled on the SBRI agreement.

The situation with the FHCRC is more complex. The MCB program is jointly administered by the UW and the FHCRC, yet the documents outlining the agreement are not comprehensive. In particular, the handling of student and human resource policies, including union issues, needs to be addressed. The agreement between the UW and the FHCRC that establishes the joint administration of the MCB program states it should be reviewed at three-year intervals and continues until terminated. However, it has not been updated since 2003, and no formal mechanism is in effect to ensure that the agreement is current.

In addition to issues related to interactions among institutions, there are several issues relating to administration within UW that need to be addressed. The MCB Program may need assistance from the Graduate School and other members of the administrative hierarchy to resolve some of these issues:

A. Participating institutions, including FHCRC, ISB and SBRI, use staff assignments to pay salary, tuition and benefits for non-resident students in permanent labs with their faculty, so that students are paid indirectly through MCB. This means that monies transferred to MCB are governed by the Office of Sponsored Programs and their policies. In particular, changes in OSP policy relating to Advance Budget Requests make it difficult to meet payroll deadlines. Previously, an administrator could submit an Advance Budget Request form guaranteed by the program asking for the new budget. Currently, the Program must present an Advance Notice prior to receipt of the award in order to apply for an advance budget. This has proved a major handicap when trying to establish appointments before the Payroll deadline. The MCB Program and the Institution are aware of the need to set up these contracts, but it takes time for the Institution to generate the contract, get the requisite signature at their end, and then submit to the Program. Then the MCB Program must generate the eGC1 and forward the signed contract to OSP. MCB needs to be able to apply for an advance budget as soon as it becomes aware that a staff assignment will be needed—in order to meet Payroll deadlines.

B. The School of Medicine Office of Research and Graduate Education has designated the MCB Program and its Steering Committee as the authority to approve all new and revised Conjoint course applications in the Basic Sciences. The Program has complied with that requirement, but the SOM Curriculum Committee also requires the MCB program to garner the signatures of the ten department chairs in the Basic Sciences before submitting course applications to their office. This effort to gather chair signatures takes approximately two weeks for each application. However, the Steering Committee has a representative, often the chair, from each of these departments. That makes the time-consuming requirement for both Steering Committee and Chairs' written approval redundant. MCB requests that Steering Committee approval alone should suffice to satisfy this requirement.

C. For many years the MCB Program has offered a joint MBA option with the UW Bothell campus. Approximately six years ago the tuition between the two institutions, that is, between Graduate Tier 1 and the MBA Program, have begun to diverge. Up until that point, MCB students would pursue the MBA with no additional tuition charges above Tier 1 levels. However, with the growing divergence between the two tuition levels, MCB students must now pay out of pocket for any tuition charges above the Tier 1 level. This has proved a handicap to MCB students, requiring increasing loan indebtedness if they wish to pursue the joint MBA degree. If possible, if MCB students might receive a waiver from the Bothell MBA Program for that portion of the tuition above Tier 1, it would greatly increase the appeal of pursuing this joint degree. Only one or at most two MCB students apply and are admitted to the MBA Program each year.

3. How can the MCB Program build and increase coherence across areas of interest?

The MCB program by design is interdisciplinary, attracting students with broad interests across disciplines of molecular and cellular biology. The original goals of the program were to provide opportunities for students broader than the curricula of existing graduate programs. With the growth of faculty associated with MCB, the program also provided the opportunity to explore research in multiple departments and divisions across institutions. The program typically attracts high-achieving students with broad, sometimes undefined interests. Given that a student performs three lab rotations, with an option of a fourth, it is difficult for them to systematically evaluate the 250 faculty options associated with the program.

A similar problem exists with the design of curriculum. The program is designed to allow students to tailor their coursework to meet their needs through a combination of core CONJ courses and electives. While this rather unstructured curriculum allows the design of interdisciplinary programs for individual needs, it is difficult for students to assess all available coursework options.

One solution to this problem is to highlight continuities in disciplines within the program. By grouping research and teaching under distinct areas of interest, students can more easily find laboratories and courses that meet their needs. To begin to address this issue, we have developed eight areas of interest within the program by polling faculty: Cancer Biology; Cell Biology, Signaling and Cell/Environmental Interactions; Developmental Biology and Stem Cells; Gene Expression, Cell Cycle and Chromosome Biology; Genetics, Genomics and Evolution; Microbiology, Infection and Immunity; Molecular Structure and Computational Biology; Neuroscience. A previous attempt at developing categories had yielded 51 different areas, so a reduction to eight was some progress.

We are redesigning our web site so that each area of interest will include listings of faculty, students, classes and other items such as group meetings on distinct pages. This would allow all information to be in one place. While this is easy to implement for faculty and students, it is more difficult to keep course listings, meetings, etc. up-to-date. One possibility would be to enlist faculty to act as area directors, serving as a source of information for students for each area and share responsibility for keeping information current.

A related issue occurs with seminar announcements. Each department and center has a series of seminars that are often of appeal to MCB graduate students. Announcements are constantly forwarded to the MCB office for distribution and to students. However the sheer volume of notices makes it difficult to separate the signal from the noise. It would be possible to develop a unified calendar system but again would require constant updating. One solution would be to get constituent programs to agree to a common calendaring system such as Bedework, where individual departments would enter information for a common calendar for their own seminar series and could display the calendar linked to their own web sites.

4. How can the MCB program improve the breadth and depth of courses offered for its students?

There are a large number of courses available to our students through different departments at the University of Washington. However, there is a need for renewal and expansion in the selection of courses in the Conjoint series. We would like to have a balance of courses that pertain to each of the areas of interest. There has not been a systematic effort for top-down planning of these courses for some time.

We believe that our plan to implement Areas of Interest within the MCB program (see response to question #3) will help to identify courses that are needed to ensure our students have access to core

knowledge. We intend on appointing two directors for each of the 8 Areas of Interest. These Area directors would then be responsible for assessing the courses that any student interested in that Area should take. Importantly, the Area directors will also identify gaps in the course curriculum, propose new courses to cover those gaps, and identify MCB faculty members who could teach these new courses.

There is always some difficulty in getting faculty who have numerous other responsibilities to take on teaching of new courses. We believe that implementing a minimum teaching requirement (see question #2) will help us in making an incentive for faculty to teach new classes and/or continue our existing classes. Another difficulty is that MCB can only indirectly influence what courses are offered to our students, since teaching responsibilities are assigned by department. Conjoint courses were originally developed to reduce duplication of teaching effort among departments. Each department agreed to offer conjoint courses so that the conjoint series as a whole covered the breadth of biomedical sciences. However, other teaching responsibilities often make the Conjoint series seem to be lower priority. It would help if graduate teaching could be viewed on par with other activities. It is important that in the new Activity-Based Budgeting scheme that appropriate credit is given for graduate teaching.

APPENDIX A:

ORGANIZATION CHART, MOLECULAR AND CELLULAR BIOLOGY PHD PROGRAM

	Co-Directors		
	David Raible	Michael Emerman	Steering Committee Members
Institutions:	University of Washington	Fred Hutchinson Cancer Res. Ctr	*Institute for Systems Biology* (John Aitchison)
			Seattle Biomedical Res. Inst. (Nick Crispe)
			FHCRC Representatives: Paul Lampe, Barry Stoddard, Steve Tapscott, Toshi Tsukiyama, student: Alison Brooks
Staff:	Program Manager	Center Program Manager FHCRC	*UW Representatives by Department*: Alan Weiner, Biochemistry
	Graduate Program Specialist		Rachel Wong, Biological Structure David Parichy, Biology
	Program Coordinator		Bob Waterston, Genome Sciences Joan Goverman, Immunology
	Fiscal Specialist		Sam Miller, Microbiology Lee Ann Campbell, Pathobiology
			Dan Storm and Randy Moon, Pharmacology Mark Bothwell, Physiology-Biophysics
			Student: Jay Chaplin

APPENDIX B.

2003-05 BIENNIUM	**2003-04**			**2004-05**		
U.W. and FHCRC	**Expenditures**			**Expenditures**		**TOTAL FOR**
Category	**U.W.**	**FHCRC**	Total	**UW**	**FHCRC**	**BIENNIUM**
STUDENT SUPPORT (includes stipends, tuition and benefits for first-year students)						
AY:28 students total				*AY:20 students total*		
Total 1st yr MCB Student Support:	739,648		739,648	560,677		**1,300,325**
RECRUITMENT VISITS (Includes airfare, lodging, food and entertainment during two visits with approx. 30 applicants at each)						
Total MCB Recruitment Expenses	57,289	2,188	59,477	50,491	2,063	**112,031**
PUBLICITY (includes MCB brochures, flyers, URM recruitment fairs, Peterson's Guide, and Web page development)						
Total MCB Publicity:	10,055	5,391	15,446	12,448	5,190	**33,084**
SYMPOSIUM (includes honoraria, airfare, hotels and meals for visiting speakers; symposium held approx. every two years)						
Total MCB Symposium:	4,635	2,599	7,234	3,877	2,158	**13,269**
STUDENT WORKSHOPS (includes Biomed workshops, rotation talks, retreat, student travel to conferences, and other events)						
Total MCB Workshops:	32,631	718	33,349	24,320	657	**58,326**
CLASSROOM EXPENSES (includes FHCRC costs for Conjoint courses, MCB Office electronics, and first-year students' laptops)						
Total MCB Classroom Expenses:	5,459	1,991	7,450	13,000	2,305	**22,755**
OPERATIONS (includes telephone, copy machine, postage, supplies, orientation related costs, web page maintenance, insurance, etc.)						
Total MCB Operations Expenses:	15,402	1,779	17,181	17,649	817	**35,647**
STAFF SUPPORT (includes partial salaries for FHCRC and UW MCB staff plus temporary employee duirng admissions)						
	136,033	37,062	173,095	145,166	39,462	357,723
Total First Year MCB Program Expenses	1,001,152	51,728	1,052,880	827,628	52,652	**1,880,508**

2005-07 BIENNIUM U.W. and FHCRC **Category**	**2005-06** **Expenditures** **U.W.**	**FHCRC**	Total	**2006-07** **Expenditures** **UW**	**FHCRC**	**TOTAL FOR BIENNIUM**
STUDENT SUPPORT (includes stipends, tuition and benefits for first-year students)						
AY:22 students total Total 1st yr MCB Student Support:	734,566		734,566	*AY:26 students total* 847,308		**1,581,874**
RECRUITMENT VISITS (Includes airfare, lodging, food and entertainment during two visits with approx. 30 applicants at each)						
Total MCB Recruitment Expenses	53,740	2,759	56,499	53,695	2,714	**112,908**
PUBLICITY (includes MCB brochures, flyers, URM recruitment fairs, Peterson's Guide, and Web page development)						
Total MCB Publicity:	13,667	6,715	20,382	13,059	5,599	**39,040**
SYMPOSIUM (includes honoraria, airfare, hotels and meals for visiting speakers; symposium held approx. every two years)						
Total MCB Symposium:						**0**
STUDENT WORKSHOPS (includes workshops, rotation talks, retreat, student travel to conferences, and individual events)						
Total MCB Workshops:	37,845	966	38,811	17,640	1,025	**57,476**
CLASSROOM EXPENSES (includes FHCRC costs for Conjoint courses, MCB Office electronics, and first-year students' laptops)						
Total MCB Classroom Expenses:	20,000	1,584	21,584	24,181	1,343	**47,108**
2005-09 Biennium (Continued)						
OPERATIONS (includes telephone, copy machine, postage, supplies, orientation related costs, web page maintenance, insurance, etc.)						
Total MCB Operations Expenses:	19,653	2,411	22,064	21,181	627	**43,872**
STAFF SUPPORT (includes partial salaries for FHCRC and UW MCB staff plus temporary employee duirng admissions)						
	149,202	**44,391**	193,593	177,178	45,548	**416,319**
Total First Year MCB Program Expenses	1,028,673	58,826	1,087,499	1,154,242	56,856	**2,241,741**

2007-09 BIENNIUM U.W. and FHCRC **Category**	**2007-08** **Expenditures** **U.W.**	**FHCRC**	Total	**2008-09** **Expenditures** **UW**	**FHCRC**	**TOTAL FOR BIENNIUM**
STUDENT SUPPORT (includes stipends, tuition and benefits for first-year students)						
AY:21 students total Total 1st yr MCB Student Support:	634,013		634,013	*AY:28 students total* 933,038		**1,567,051**
RECRUITMENT VISITS (Includes airfare, lodging, food and entertainment during two visits with approx. 30 applicants at each)						
Total MCB Recruitment Expenses	54,267	3,077	57,344	54,037	3,457	**114,838**
PUBLICITY (includes MCB brochures, flyers, URM recruitment fairs, Peterson's Guide, and Web page development)						
Total MCB Publicity:	12,324	6,033	18,357	12,012	6,116	**36,485**
SYMPOSIUM (includes honoraria, airfare, hotels and meals for visiting speakers; symposium held approx. every two years)						
Total MCB Symposium:	0	0	0	6,405	2,032	**8,437**
STUDENT WORKSHOPS (includes workshops, rotation talks, retreat, student travel to conferences, and individual events)						
Total MCB Workshops:	23,126	725	23,851	30,217	831	**54,899**
CLASSROOM EXPENSES (includes FHCRC costs for Conjoint courses, MCB Office electronics, and first-year students' laptops)						
Total MCB Classroom Expenses:	29,484	694	30,178	28,677	414	**59,269**
OPERATIONS (includes telephone, copy machine, postage, supplies, orientation related costs, web page maintenance, insurance, etc.)						
Total MCB Operations Expenses:	27,416	1,973	29,389	26,041	1,616	**57,046**
STAFF SUPPORT (includes partial salaries for FHCRC and UW MCB staff plus temporary employee duirng admissions)						
	187,991	53,518	241,509	189,239	52,789	**483,537**
Total First Year MCB Program Expenses	968,621	66,020	1,034,641	1,279,666	67,255	**2,314,307**