External Review of the Undergraduate Program:
Department of Microbiology and Immunology

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Executive Summary: Department of Microbiology and Immunology Undergraduate Program Review  
May 4, 2010

The Department of Microbiology and Immunology was reviewed on February 25, 2010 by Dr. Elizabeth Worobec, an associate professor in the Department of Microbiology at the University of Manitoba, who also has experience serving as Associate Dean (Student Affairs) and as the former Assistant Head of Microbiology. As the SUUPR representative, I also participated. Unfortunately, no student representative was available to serve on the review committee. Dr. Worobec’s informative and thorough report was received by the Department on March 10, 2010. The Undergraduate Education Committee reviewed the report and responded on April 27, 2010. This summary is not meant to repeat what is available in the aforementioned documents, but simply to highlight the key conclusions of the review.

The review itself included information provided in a comprehensive and well organized Self-Appraisal document as well as that gathered during the site visit. Interviews were carried out with all the important stakeholders, including the Vice-Provost (Academic Planning, Policy and Faculty), the Vice Provost (Academic Programs and Students), the Associate Dean Basic Medical Sciences, the department’s UEC committee, its Chair, 14 teaching faculty, the teaching and research coordinator and the laboratory coordinators. A small but very engaged group of current undergraduate students were consulted, and over a dozen teaching assistants, many of whom were also graduates of this undergraduate program. It was clear that everyone who participated in the review was interested in improving/evolving their programs.

Overall, the review concluded that the department has a strong complement of highly productive researchers, quality staff and an excellent teaching laboratory infrastructure. The department is providing a very strong undergraduate academic program in the fields of medical microbiology and immunology. The program gives state-of-the art training and is preparing graduates well to enter the best graduate programs in the field, professional programs and appropriate post-graduation workforces. The laboratory technique course (3600G) was highlighted as a hallmark course providing the students an opportunity to develop a suite of laboratory skills required in microbiology and immunology. The resources available to the students as they progress through their module programs, which include counselling services and library facilities, was found to be excellent. While the department offers a number of modules and contributes to several modules in other BMSc programs, the Honors Specialization module (HSP) is its largest enrolment program. This module structure is committed to the university’s strategic plan of providing undergraduate research experiences, especially during, but not limited to, the Research Project and Seminar course (4970E). This course not only allows the students to develop laboratory research skills, but also the equally important soft-skills such as scientific writing and oral presentations.

The review resulted in a number of recommendations that are mostly related to improving the student experience, which will further strengthen and grow the program. In their response to the external reviewer’s report, the department indicated that they are already actively engaged in implementing changes to address these recommendations. To their credit they had already identified many of the issues in their own SWOT analysis provided as part of the Self-Appraisal. Some of the key recommendations are related to how students indentify themselves and enter the program, which has
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the capacity for more students in the HSP. Because of the unique structure of the BMSc programs, students enter a specific program in year 3 of their studies. Microbiology and Immunology has no identified course in years 1 or 2 (1000 or 2000 level), so students tend to enter the program without a foundational course that establishes what this field of study really is about. The department was encouraged to develop a 2000 level course that would provide students the ability to assess and understand the field of study and lead to increased interest in the programs of study. The HSP module in Microbiology and Immunology (and indeed other areas of study in the BMSc) is highly competitive and therefore has enrolment limits. Students indicated that being an elite program makes it very attractive, but there is a perception that cut-off grades are so high that many students tend to apply to more “safe” Specializations. The recommendation of posting admission averages to better communicate the expectations to students is being implemented. Most of the other recommendations were directed at ways of improving student engagement and participation in courses to respond to the student suggestions of including more communication strategies in their assessments. The students also indicated a weakness in the HSP was the lack of options in courses in their final year. It was recommended that the department look to increase course flexibility and course options to the students while maintaining the overall strength and the necessary educational training in microbiology and immunology. The department’s UEC is attempting to provide these options with their current resources by re-evaluating course prerequisites and terms/years in which courses are offered.

Perhaps the biggest concern highlighted in the report was that a majority of the teaching is done by a few senior members, some of whom are emeriti. This of course could lead to difficulties in maintaining the strength of the modules in the future. The department and the Chair acknowledged this and indicated that there was a resource management plan to address these issues. The review recommended proceeding with the plan to hire a new Assistant Professor that focuses on scholarship in teaching and learning, based on a model that has worked well in Biochemistry.

The external report also included some recommendations to SUUPR to facilitate future reviews. It was recommended that the following be included as items in Departmental Self-Appraisals: i) course outlines for all courses (not just a selection of courses). This will help in assessing the level of instruction and the expected student outcomes, ii) a copy and explanation of the instructor/course evaluation form, to better define the numbers provided in many tables, and iii) that copies of exams and laboratory manuals be readily available at the time of the site visit.

In summary, the review found that the Department of Microbiology and Immunology has a very strong undergraduate program and associated modules and that it is committed to continually assess and improve their courses and student resources to provide students with the necessary skills and knowledge expected of a degree designation in this field. The department has already begun the work at meeting many of the recommendations.

Mark Workentin, Department of Chemistry

SUUPR Representative
All members of the Department of Microbiology & Immunology Undergraduate Education Committee (UEC) have reviewed the External Undergraduate Program Review by Dr. Elizabeth Worobec from the University of Manitoba.

We appreciate and acknowledge the detailed and helpful analysis provided by Dr. Worobec, and also the participation of Dr. Mark Workentin in the review process. The UEC has discussed the external reviewer’s report in detail and provide below a response to the specific recommendations listed in the report. The comments from Dr. Worobec are quoted in italics. Please note that we have not responded to the Recommendations for the Senate Subcommittee on Undergraduate Program Review (comments 1 and 2) or to the Recommendations to Administration (comments 3 through 5).

**Recommendations:**

6. That the Department continues to hold yearly retreats to review and revise the undergraduate curriculum. Undergraduate students should be surveyed yearly using similar questions to those included in the Self-Appraisal to obtain feedback for discussion at retreats.

**Response:** The Department has held yearly retreats in 2005, 2006, and 2007 to specifically discuss the undergraduate curriculum, and a combined research/teaching retreat in 2008. The UEC felt that annual retreats for specifically discussing the Undergraduate program may be unwarranted but bi-annual retreats to evaluate both undergraduate and graduate teaching would be appropriate and the UEC will make this recommendation to the Department Chair.

Undergraduate student surveys will be conducted yearly to obtain regular feedback on the program. A new 10-15 question survey will be developed using both scantron compatible questions similar to the Self-Appraisal, and space to provide additional comments. This survey will be attached to class evaluations and depending on the response may be circulated by email.

7a. That the UEC follow through with introducing microbiology at the 1000 level, either as a suite of lectures in an existing course or develop a new introductory 1000 course.

**Response:** The committee felt that adding an additional 1000 level course is not realistic giving our current faculty complement and the current course requirements. In addition, none of the other BMSc programs offer first year courses. However, please consult our response to point 7b. The UEC will investigate the feasibility of providing 1-3 lectures in Introductory Biology to introduce 1st year students to our microbiology and immunology.

7b. That a required introductory survey course at the 2000 level, similar to 2500 Biology of Infection and Immunity, be introduced and the existing program restructured to
accommodate this change. In order to ensure all interested students can take such a course in a timely manner, offer the course in fall and winter terms and possibly in the summer or via Distance Education.

Response: We felt this comment identified a major deficiency in our program, as we currently lack an appropriate introductory course covering the scope of Bacteriology, Virology and Immunology, which is also a requirement for our Honors Specialization, Specialization, or Major modules. The UEC has agreed that MI2500B (The Biology of Infection and Immunity) represents an appropriate and well-received course that can and should be used as the introductory course to our various programs. The logistics of introducing this course as the introductory course are complex and will include alteration of many of our more senior courses, but will particularly affect MI2100A (Biology of Prokaryotes) and MI3300A (Introductory Immunology) which both have significant overlap in terms of content. We agree that the course should be offered in both terms to allow students as much opportunity as possible to take MI2500B. Once the Educator position has been filled, this individual will be instrumental in facilitating this change to our program and we expect to have this for implementation by September 2012.

8. That more flexibility be built into the HSP module, particularly in the 4th year with the introduction of new courses or adding courses from other units into a pool of courses. For example, give students the option to select three from a list of five 4th year courses.

Response: The UEC agree that 4th year Bacteriology, Virology, or Immunology cannot be options for our Honors students. Students do have the option of doing their Honors in the Biochemistry of Infection and Immunity and can then take more 4th year Biochemistry courses. Our committee will investigate appropriate courses in 3rd and 4th year Biology (e.g. Biology 3332A: Parasitology) that may be appropriate for our Honors program. The UEC will investigate our capacity to incorporate a clinically oriented course in Infection and Immunity at the 4th year level.

9. That undergraduate students be introduced to high profile laboratory equipment, such as found in research laboratories and institutes (e.g. Molecular Imaging Facility, Genomics Centre, Proteomics Centre) possibly as tours during lab courses (2100 and 3600) or tutorials in lecture-only courses.

Response: This is already incorporated into our 4th year Honors thesis course where students have access to a number of high profile equipment and also have taken the required safety courses and training to be able to use the instrumentation.

10. That the UEC review all team-taught courses on a yearly basis to assess effectiveness, as based on student surveys, and follow through with changes to course delivery by, for example, limiting the number of instructors to a maximum of four per course.

Response: This will be addressed at the bi-annual teaching retreats, as well as the new surveys that are being developed. The UEC will recommend to the Chair of the
Department to limit the number of instructors per course to a maximum of four.

11. That all teaching staff incorporate oral presentations, group seminars, literature evaluation discussions and/or tours of research facilities into tutorial sessions of existing courses.

Response: We recognize this is important. Many of these practices are already incorporated into some of our courses and this will be maintained or expanded. We will recommend at the teaching retreat that every course adopt at least one of these learning exercises.

12a. That all faculty members critically review the mode of evaluation used in undergraduate courses with the goal of moving away from multiple choice, short answer only tests and exams.

Response: We agree this is important for the evaluations of students and for their development. It may be difficult to implement it for our larger courses, but definitely our 4th year courses should move away from multiple-choice examinations. The UEC and Departmental Chair will ensure that only small parts of 4th year examinations include multiple-choice questions, if at all.

12b. That all faculty members strongly consider adding writing components (essay, term paper, assignment) to courses taught.

Response: We understand that students are looking for more variety in how they are evaluated. Each faculty will be asked to consider incorporating a writing component to their course as part of the evaluation.

13. That the Department show greater flexibility in allowing 4th year HSP students to take additional courses from other units which fall during scheduled research time for the Honours Research Project course. Students should not be discouraged from broadening their experience.

Response: Students can request special permission from the UEC Chair to take one 0.5 credit course that falls within the scheduled research time. Over the last year all students that requested to take a course during the allotted research time slot were granted this request. Thus, students are not discouraged from broadening their experiences at UWO. However, the Honors Research Project course is highly practical, and effective research does require dedicated and uninterrupted time in the lab. The UEC felt that students must also realize that this course is a major component of their 4th year and that the Honors Thesis Course must take priority over multiple electives.

14. That the UEC investigate the parameters of the Biochemistry HSP with respect to flexibility, course options, and seminar course offerings and implement these aspects into Microbiology and Immunology modules.
Response: Over the summer the UEC Chair will evaluate how the Honors Biochemistry program offers courses and options available to students, keeping in mind that the Department of Biochemistry has almost double the number of faculty (47 versus 27) but do not have double the number of courses. As in point #8 we will also investigate Biology courses that are appropriate for our modules.

15. That a critical evaluation of Intent to Register Sessions be undertaken with the goal of incorporating more useful information on admission requirements and course selections. The UEC should poll undergraduate students to determine the most effective use of these sessions.

Response: The BMSc Program holds information sessions for undergraduate students regarding the Intent to Register process. This year the BMSc Program also introduced two new information sessions targeting undergraduates in Years 1 and 2 to provide general information about the BMSc program and each Department. The Department of Microbiology & Immunology also presented a description of their individual programs. Both sessions were well attended, mostly by 1st year students. As suggested, we will also include a question regarding information about the Intent to Register Sessions.

16. The UEC review the evaluation process for the Honours Research course and moderate individual evaluation by supervisors to ensure all students are treated equitably.

Response: The UEC has discussed the current evaluation process for the Honors Research Course. Students receive a written evaluation and a mark out of 8% from their individual supervisor in early January. The timing of this evaluation is to provide feedback in the event the student is not achieving expectations. The remainder of the supervisor evaluation is worth 20% and is received at the end of the course. To our knowledge, there has never been a complaint regarding the supervisor evaluations and we decided that it is not appropriate to monitor individual evaluations. However, to more standardize the marking, specific descriptors will be provided to aid faculty in providing similar marks for similar work/achievement.

17a. That admission percentages for modules and programs be published (on the departmental website) for the past three years and updated each year.

Response: We will publish these averages on our Departmental website.

17b. That the Department better advertise program admission requirements and communicate to students that the quota of HSP students will vary yearly depending on the number of Honours Research Project positions available.

Response: Students are not always aware of the admission requirements and we will attempt to provide clearer information on our Departmental website and also provide links to the information on the BMSc website.
17c. That the Department Chair encourage all faculty to mentor HSP research course students and seriously consider increasing the number of positions in their labs.

Response: Currently, almost all members with active research laboratories routinely take Honors students into their laboratories. Many research laboratories take two and sometimes even three Honors students. The Department Chair will continue, as always, to encourage all faculty members with active research programs to mentor HSP students.

18. That the Department strives to instill a sense of community among the undergraduate students in the Microbiology and Immunology programs. Some suggestions include:
- September welcome event, Christmas parties and a farewell event in March/April.
- implementing a mentor system whereby senior undergraduate students are paired with junior undergraduate students.
- encourage all undergraduate students to attend guest seminars. Perhaps attach marks in relevant courses to attendance at specific guest seminars.
- involve undergraduate students in all recruitment events. This instills a sense of belonging and pride in their program.

Response: The UEC understands that some students do not feel part of the community, but the Department of Microbiology & Immunology already makes significant efforts to include Undergraduates within Departmental events. Our Department holds a welcome BBQ each year for our 4th year Honors class after students are matched into their respective laboratories. Our Department also holds an annual Christmas party to which undergraduates are invited and they often do attend. Our Department also holds a lunch for our graduating students and their families. In addition, our Honors students are always included on seminar announcements and there are no classes during the external seminar time slots. Undergraduates do occasionally attend but in most cases do not. Occasionally students have been required to attend a relevant external seminar and the attendance is enforced by making the seminar testable. For the last point, recruitment seminars are clearly listed and undergraduates are again welcome to attend. The “sense of community” really seems to vary from year-to-year with some classes being highly involved with Departmental and social activities, whereas other year’s students are less engaged.

19. That pre-lab or spot quizzes, worth a sizeable percentage of the lab mark, be introduced into both lab courses.

Response: The UEC agrees that this is a good idea. We will try to incorporate this into our laboratories.

20. That additional formal laboratory reports be introduced into both lab courses as a means to improve writing skills.

Response: We agreed that there were already opportunities to write laboratory reports.

21. That year-end written, and in the case of Microbiology & Immunology 2100, practical lab exams be introduced to both lab courses.
Response: The UEC agrees with this and will work towards implementation on this point.

22. *That the Department Chair devise a three-five year plan for teaching assignments paying utmost attention to future retirements.*

The Department Chair will devise a three to five year plan for teaching assignments with a focus on future retirements and current recruitment initiatives.
I. Introduction

The Department of Microbiology and Immunology is responsible for the delivery of the Honours Specialization, Specialization, Major, and Minor in Microbiology and Immunology, plus participates in the Honours Specialization in Biochemistry of Infection and Immunity. In addition courses offered by the Department are included in the Honours Specialization, Specialization, Major, and Minor in Medical Sciences. Most course offerings are available to students in both BMSc and BSc programs provided they have the appropriate pre-requisites, however, only BMSc students may take the Honours Specialization and Specialization modules.

The BMSc program, in general, is unique, as is the modular system, and frankly confusing to an outsider such as myself. Students, however, appear to understand the degree requirements which attests to excellence in program promotion and student advising.

Students enter the various programs offered by the Department of Microbiology and Immunology with a strong foundation in basic science and progress through an appropriate selection of Biochemistry, Organic Chemistry, Biology, and Microbiology and Immunology courses. The Department offers an intensive, focused suite of courses covering all aspects of medical and molecular microbiology and immunology, including the hallmark Laboratory Techniques Course (3600G) and Research Project and Seminar Course (4970E). Students graduating from these programs will have developed a strong academic preparedness in the fields of medical microbiology and immunology along with concomitant laboratory skills. In the case of Honours Specialization, students will have the opportunity to develop laboratory-based research skills, writing a scientific manuscript and giving conference-like oral presentations.

The Department of Microbiology and Immunology is a research intensive department with many adjunct and cross-appointed faculty members from research institutes. Given that the majority of the course instructors are highly productive researchers, there is no doubt that students are receiving the state-of-art training and will graduate well prepared to enter graduate programs, professional programs (such as Medicine, Dentistry, Pharmacy) and the appropriate workforce (e.g. pharmaceutical industry, health-care industry). However, I am concerned that the majority of teaching is done by senior faculty members, some of which are emeriti, which may pose staffing issues in the very near future. This may be partially alleviated by the hiring of the new Assistant Professor in Undergraduate Education.

Although I was impressed with the Microbiology and Immunology Programs, there is certainly room for improvement. In the following report I will highlight the strengths and offer recommendations which should assist the Department in making their very good programs, excellent. Of note, the majority of my recommendations reiterate the findings of the Departmental SWOT Analysis and were emphasized during our meetings with the various stakeholders.
II. The Review Process:

My understanding is that my review should cover the following three broad areas which focus on learning objectives and outcomes, program quality and program design, and quality and quality of resources provided. My external review is based on the examination of materials received in the Self-Appraisal document and site-visit interviews and tours. Prior to my February 25, 2010 site-visit, I received a comprehensive Self-Appraisal which contained the required information as outlined in the Guidelines for the Appraisal of Undergraduate Programs. Also included were Departmental and Program brochures and CDs containing the CVs of four instructors and University and Schulich School of Medicine and Dentistry Strategic Plans. Upon reading the material provided I submitted a list of largely practical questions to Dr. Koval. I received a satisfactory response from Undergraduate Education Committee (UEC) Chair John McCormick, which I have appended (Appendix A). At the site-visit I requested and received course outlines for select courses not included in the original package, a copy of the Instructor and Course Evaluation Form, and additional enrolment information. Dr. Susan Koval, past Chair and present member of the Departmental Undergraduate Education Committee, was the Departmental contact and organizer for the site visit. Dr. Koval also served as host for the site visit. Dr. Mark Warkentin, Department of Chemistry, represented the SUPR and participated in all aspects of the site visit.

Recommendations for the Senate Subcommittee on Undergraduate Program Review:

1. That course outlines for all courses and Instructor and Course Evaluation Form (or list of questions) be included in the Self-Appraisal Report.

2. That copies of exams and laboratory manuals be available at the time of the site visit (not necessarily included in the Self-Appraisal) for the external reviewers to examine if required.

III. General Strengths of the Programs and Department as Pertaining to Programs:

1. All Departmental faculty members are required to do some undergraduate teaching, including cross-appointees. There is a good mix of mixture of senior and junior faculty members teaching undergraduates leaving little need to hire sessional instructors. All instructors are enthusiastic and passionate about the courses they teach.

2. The Department has a very active Undergraduate Education Committee, made up of a good cross-section of instructors and a graduate student. The UEC is not afraid to make substantial changes and it appears as though the initiatives developed by the UEC are well received by all faculty members.

3. The Department holds yearly retreats where one topic is curriculum and program review.

4. The Department presently has a large group of engaged and committed Teaching Assistants who are excellent role models for undergraduate students.

5. The Department is predominantly comprised of research intensive faculty members who share their expertise with undergraduate students and introduce students to the most current topics.

6. The required Laboratory Techniques course (3600) is highly relevant to curriculum and allows for students to develop a relevant skill set in molecular biology and immunology. Students receive a unique hands-on experience working with mice to generate antibodies.
7. The Honours Research Project course (4970) is the keystone course of the HSP whereby students are heavily immersed in a research project. They learn experimental design, and receive training in practical research skills, giving oral presentations, and writing a journal-style final report.

8. The imminent hiring of an Assistant Professor in Undergraduate Education should be transformative with respect to the development of new courses and curriculum restructuring.

9. Most courses are very popular and have sizeable enrolments of BMSc and BSc students.

IV. Findings from the Site-Visit and Resultant Recommendations:

a. Meetings with Senior Administrators:

The site-visit began with a meeting with Dr. Alan Weedon, Vice-Provost (Academic Planning, Policy and Faculty) and Dr. John Doerksen, Vice-Provost (Academic Programs and Students and Registrar) who described the undergraduate program review process and key issues the review should address (i.e. learning outcomes, degree expectations, the student academic experience, and adequate resources). We also discussed how teaching factored into tenure and promotion and the teaching allocation process, for example, with cases such as CRC Chair recipients. In the afternoon we met with Dr. Doug Jones, Associate Dean (Basic Medical Sciences - Undergraduate) where we discussed the admission process, focusing on cut-off GPAs for certain HSP modules. We also touched on student advising and instructor/course evaluations. We also discussed the lack of laboratory and classroom space, and how the addition of new courses (with and without lab components) could be accommodated. Dr. Jones mentioned that a new teaching facility was under consideration. Right now it appears that if new courses were introduced the major challenge would be the lack of adequate space to run the lectures and labs.

Recommendations to Administration:

3. That a new teaching facility include space for the expansion of the BMSc program with respect to an increase in the number of students enrolled and introduction of new courses.

4. That an Undergraduate Laboratory Space Users Group be established for Room 120 Medical Sciences Building with representation from all stakeholders.

5. That the former, now vacant, teaching laboratory be renovated into useable laboratory space for Microbiology and Immunology undergraduate courses. Input from undergraduate laboratory staff is essential in the design of any new teaching lab facilities.

b. Meeting with the Undergraduate Education Committee (UEC):

UEC Chair Dr. John McCormick led the meeting with a brief description of the programs and courses offered by the Department of Microbiology and Immunology. We discussed the Honours Research course, student advising, and the extent of written requirements in courses. I was impressed by the enthusiasm for the program and the desire to continue to evolve the program to better suit student needs. Some aspects of the SWOT Analysis from the Self-Appraisal were raised and I was also very impressed to see our meeting turn into a brainstorming session focusing on including an introductory survey course at the 2000 level. Such a course would act as a hook for undecided students and give students a taste of the three key features of the program, bacteriology,
virology and immunology, along the lines of what is given in the existing service course, 2500 Biology of Infection and Immunity. We also discussed the introduction of new courses, such as a 4000 course in Clinical Immunology, to provide more options in the 4th year of the HSP module. I found that there was also a tangible concern amongst members of UEC that students are not finding out about Departmental programs until their 2nd or 3rd year and because of this some excellent students are opting for other programs. A proposal to introduce several microbiology lectures into first year biology courses was made and the committee found this to be an excellent idea. I also asked if students were exposed to the state-of-the-art equipment in research facilities and suggested lab tours of such facilities (e.g. electron microscope suite, flow cytometer, proteomics facilities, etc.). I also commented on how I was impressed with the yearly retreat for faculty and staff where curriculum and course offerings were reviewed. I encouraged the UEC to continue with this practice.

**Recommendations:**

6. **That the Departmental continues to hold yearly retreats to review and revise the undergraduate curriculum. Undergraduate students should be surveyed yearly using similar questions to those included in the Self-Appraisal to obtain feedback for discussion at retreats.**

7a. **That the UEC follow through with introducing microbiology at the 1000 level, either as a suite of lectures in an existing course or develop a new introductory 1000 course.**

7b. **That a required introductory survey course at the 2000 level, similar to 2500 Biology of Infection and Immunity, be introduced and the existing program restructured to accommodate this change. In order to ensure all interested students can take such a course in a timely manner, offer the course in fall and winter terms and possibly in the summer or via Distance Education.**

8. **That more flexibility be built into the HSP module, particularly in the 4th year with the introduction of new courses or adding courses from other units into a pool of courses. For example, give students the option to select three from a list of five 4th year courses.**

9. **That undergraduate students be introduced to high profile laboratory equipment, such as found in research laboratories and institutes (e.g. Molecular Imaging Facility, Genomics Centre, Proteomics Centre) possibly as tours during lab courses (2100 and 3600) or tutorials in lecture-only courses.**

10. **That the UEC review all team-taught courses on a yearly basis to assess effectiveness, as based on student surveys, and follow through with changes to course delivery by, for example, limiting the number of instructors to a maximum of four per course.**

c. **Meeting with Undergraduate Students:**

We met with three 4th year students and one recent graduate. This was a highly engaged, mature and knowledgeable group of students who presented very candid responses to our questions. If these students were indeed a representation of all students in Departmental-run HSP modules, I have no doubt about the quality of educational outcomes. Students were asked to describe the path taken to date, strengths of the program, weaknesses of the program and were asked to suggest improvements
and changes. The students were enthusiastic and, for the most part, very satisfied with the program. There, however, was an overwhelming feeling that the Biochemistry programs have more flexibility in offerings and have courses giving students more opportunity to have written assignments, oral presentations and critical evaluation of recent literature. Points of note raised by the student group include:

- not exposed to enough introductory Microbiology and Immunology in first and second year.
- ‘perceived’ high GPA cut-offs for admission into certain modules deterred students from submitting applications.
- no Microbiology and Immunology courses in first term of the 3rd year while the second term is very heavy.
- received very good training in a variety of disciplines.
- 4th year thesis course excellent for preparation for graduate studies.
- want a seminar course where students are exposed to more faculty members’ research areas and as a venue to have more practice at oral presentations and critical evaluation of recent literature.
- lack of community among undergraduate students in the program; no venue to interact in common courses or social events.
- lack of choice and flexibility in the HSP module.
- want more opportunities to submit written assignments for evaluation.
- want more focus on communication skills and group work.
- majority of courses have midterm and final exams as sole means of evaluation; wanted more assignment, presentations. There was a perception that instructors do not like marking so opt for multiple choice and short answer exams as modes of evaluation.
- discouraged from taking extra courses that may overlap with the Honours Research course.
- perception of great variation in expectations for what Honours Research course supervisions expect from students.
- Intent to Register sessions are misleading and do not contain useful information for students to make meaningful choices; too much self-promotion not enough practical information.

**Recommendations:**

11. That all teaching staff incorporate oral presentations, group seminars, literature evaluation discussions and/or tours of research facilities into tutorial sessions of existing courses.

12a. That all faculty members critically review the mode of evaluation used in undergraduate courses with the goal of moving away from multiple choice, short answer only tests and exams.

12b. That all faculty members strongly consider adding writing components (essay, term paper, assignment) to courses taught.

13. That the Department show greater flexibility in allowing 4th year HSP students to take additional courses from other units which fall during scheduled research time for the Honours Research Project course. Students should not be discouraged from broadening their experience.
14. That the UEC investigate the parameters of the Biochemistry HSP with respect to flexibility, course options, and seminar course offerings and implement these aspects into Microbiology and Immunology modules.

15. That a critical evaluation of Intent to Register Sessions be undertaken with the goal of incorporating more useful information on admission requirements and course selections. The UEC should poll undergraduate students to determine the most effective use of these sessions.

16. The UEC review the evaluation process for the Honours Research course and moderate individual evaluation by supervisors to ensure all students are treated equitably.

17a. That admission percentages for modules and programs be published (on the departmental website) for the past three years and updated each year.

17b. That the Department better advertise program admission requirements and communicate to students that the quota of HSP students will vary yearly depending on the number of Honours Research Project positions available.

17c. That the Department Chair encourage all faculty to mentor HSP research course students and seriously consider increasing the number of positions in their labs.

18. That the Department strives to instill a sense of community among the undergraduate students in the Microbiology and Immunology programs. Some suggestions include:
   - September welcome event, Christmas parties and a farewell event in March/April.
   - implementing a mentor system whereby senior undergraduate students are paired with junior undergraduate students.
   - encourage all undergraduate students to attend guest seminars. Perhaps attach marks in relevant courses to attendance at specific guest seminars.
   - involve undergraduate students in all recruitment events. This instills a sense of belonging and pride in their program.

d. Meeting with Support Staff associated with the Undergraduate Programs:

We met with the Teaching and Research Coordinator and the Head and Assistant Laboratory Coordinators. There are two required laboratory based courses offered by the Department. Labs are run in a new laboratory which is shared by several other units. This has many challenges such as scheduling and difficulty in students returning to the lab on subsequent days for follow-up experiments. There is no room for expansion of the program or the introduction of new courses with a lab component. The original lab remains dormant and will take several millions to renovate to develop usable space and meet safety codes (Recommendation 5). However, staff were satisfied with the present working arrangements and had a good rapport with staff from units sharing the new lab. Staff were also satisfied with the quality and quantity of lab equipment and preparation facilities. Staff commented that faculty members were very receptive to ideas from staff regarding new or revised labs and that there was a very collegial relationship between faculty and staff.
e. Meeting with Teaching Faculty:

A substantial number of faculty members (14) involved in teaching attended an afternoon session. I was extremely impressed with the turn out and the candid discussion. All present were passionate about teaching and appeared to be happy with the course(s) taught. Each faculty member was asked to list courses most recently taught and her/his general field of research. At this time I brought forward some of the suggestions and concerns that arose from earlier meetings (see above recommendations) such as the lack of written evaluation, critical evaluation of literature, group discussions or seminar courses, and introducing a 2000 level core course. I felt a general interest in making some of these changes although it may increase individual work loads. It will have to be up to the Department Chair to ensure there is buy-in with all faculty to move forward with the proposed changes.

f. Meeting with Teaching Assistants:

We met with over a dozen TAs. There are two laboratory courses, 2100 and 3600. Junior TAs generally participated in the 2100 labs while experienced TAs participated in the 3600 lab. TA duties include delivering the pre-lab lecture, demonstrating procedures, assisting students and marking laboratory reports. There was a general feeling that the TAs were well mentored by lab course instructors. There was a very good sense that students taking the Microbiology and Immunology lab courses were well trained and exited with useful laboratory skills. TAs were asked how UWO labs compared with those taken/TA’d at other universities and again the general consensus was that they were on par. The group was asked how they could improve the laboratory experience and all were in agreement that the students in 2100 came ill-prepared for each lab and did not have good writing skills. Suggestions such as pre-lab quizzes, to ensure students were prepared for each lab, lab exams, both written and practical, and more written lab reports were made and again there was a general agreement that these changes would increase student engagement and better writing skills.

Recommendations:

19. That pre-lab or spot quizzes, worth a sizeable percentage of the lab mark, be introduced into both lab courses.

20. That additional formal laboratory reports be introduced into both lab courses as a means to improve writing skills.

21. That year-end written, and in the case of Microbiology and Immunology 2100, practical lab exams be introduced to both lab courses.

g. Wrap-up Meeting:

The site-visit ended with a meeting with Department Chair Miguel Valvano, UEC Chair John McCormick and Site-Visit Coordinator and former UEC Chair Susan Kovel where we summarized our findings from the day. Concern was raised about the heavy teaching load on senior and retired faculty members. Dr. Valvano assured us that he will do whatever possible to promote teaching by all faculty members. He suggested incorporating research expertise into lectures and could see that
the introduction of critical evaluation of literature and seminar/discussion component to senior courses (Recommendations 11 and 14) would be a good way for faculty members to promote their research interests. SUPR representative Mark Warkentin reiterated that the students were very happy with the programs but had some legitimate concerns including a lack of a sense of community (Recommendation 18), lack of choice in the 4th year (Recommendations 8 and 14), and minimal writing experience (Recommendation 12b). He also described how most students stumble upon the Microbiology and Immunology programs in 3rd year, again re-enforcing the need for more general courses in the 1st and 2nd year (Recommendations 7a and 7b) and how students avoid applying for certain HSP modules due to a false perception that admission grade cut-offs are too high (Recommendations 17a and 17b).

**Recommendation**

22. That the Department Chair devise a three-five year plan for teaching assignments paying utmost attention to future retirements.

In conclusion, I would like to thank all members of the Department of Microbiology and Immunology for their cooperation and assistance. I would like to especially thank Dr. Susan Koval who donated a substantial amount of her time chauffeuring me around and answering my endless questions. I wish the Department much success in producing highly successful and meaningful undergraduate programs.

Respectfully submitted by:

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Appendix A

Pre-Site-Visit Questions from External Reviewer Elizabeth Worobec and UEC Response

I have read through the review documents and am quite impressed how thorough it is. I do have some questions that will help me sort out a few things and would rather get the answers now instead of waiting until the site visit. Here goes:

1. I am unclear about the internship programs. Do students get credit towards their degree? How are they evaluated? How many students in your programs participate?

This year, there are 12 students registered in the BMSc program who are completing an internship placement. Last year, 8 students completed a placement. There is a recent proposal to revise the Internship course to 1.0 credit (Pass/Fail).

2. I would like to know in very brief terms the requirements for entry into the professional programs such as medicine, dentistry, pharmacy. You list how many students from your programs go into these professional programs but I would like an estimate of how many are pre-professional and/or wanna-bes. For example, I teach a 3000 level course called Mechanisms of Microbial Disease (likely similar to your 4100A) where the enrolments are typically around 200 students, of these 50 are in the pharmacy program and the remaining 150 think they are getting into medicine.

Students need to complete a four-year honors degree or the equivalent as a prerequisite for Schulich Medicine. Schulich Dentistry requires completion of at least two years of university study but the majority of students admitted have completed an honors degree. A Pharmacy program is not offered at Western (University of Toronto and University of Waterloo offer such programs in Ontario). Students need to complete either one year (U of Toronto) or two years (U of Waterloo) of university study for admission consideration. It is probably pretty safe to say that the primary goal of the majority of students registered in the BMSc program is either Medicine or Dentistry, at least initially.

3. I am confused by the entry requirements with respect to Math - do students have to take both A and B of their chosen math courses, e.g. Math 1225 A/B or can they take the A part of two different math courses? I am assuming that in most cases you need the A part to take the B part.

Math 1225A/B, for example, is a half course that can be offered in either or both terms. A student would take it either in the first term as Math 1225A or in the second term as Math 1225B. In some cases, a course may be listed as A/B in the academic calendar but may appear as only an A course in the timetable. The calendar lists the potential whereas the timetable for the year lists the reality.

4. On the math topic, why are there so many math courses to choose from? Surely there are one or two which are most helpful for the program, like Stats, or are prerequisites or co-requisites for other important courses.

The Departments of Mathematics and Applied Mathematics offer a relatively large number of math courses for first-year students registered primarily in the Faculty of Science with their secondary audience being students in the Faculty of Social Science. Students can choose to take a half course in Calculus, e.g. Calculus 1000A, and a half course in finite math, e.g. Math 1228B, to complete the full credit required in first-year mathematics. The most common combination of half courses to complete the first-year math requirement is either Calculus 1000A or 1100A and Calculus 1301B.

The Department of Medical Biophysics is the only basic medical science department that specifies which first-year math course (calculus) is mandatory.

The mathematics requirement for entry into all the modules offered by the Basic Medical Science departments will be reviewed over the next few months.

5. How are transfer credits from other universities handled?
Credits from other universities are evaluated by departmental counselors (faculty members) to determine whether or not the transfer credits may be used as either exact replacements or substitutions for Western courses.

6. Do UWO faculty members give a preference to students taking the Honours Specialization with the research project over the students opting for the multidisciplinary Honours, without the research course?

Research projects are available (and mandatory) only in the discipline-specific Honors Specialization modules. A research project is not available to a Year 4 student in the Honors Specialization in Medical Sciences. In Year 4 of this module, students complete two half courses (Medical Sciences 4900F/G and 4930F/G). The group laboratory work undertaken in Medical Sciences 4900F/G is the same for all students and the outcome of the laboratory experiment is known by the instructor.

7. I would like to see the course outlines for all the micro/immunol courses. If this is too hard to do I would at least like to see 2500b, 3400B, 3600G, 4100A, 4700B and 4970E. Thanks.

All of the course outlines are available on our Departmental website: http://www.uwo.ca/mni/undergraduate/undergraduate_syllabi.html

8. Where did your department teach prior to 2001 when the BMSc was introduced? What was the impetus to develop a new degree structure? How does the BMSc differ from the BSc?

Prior to the introduction of the BMSc degree in 2001, students completed a BSc (Honors) degree in Microbiology and Immunology. Entry into Year 4 of this program required completion of the requirements of a 3-year BSc in Biology with the appropriate Microbiology and Immunology course prerequisites.

When the modular system was introduced at Western in 2004, students could, for the first time, receive recognition for Microbiology and Immunology as their discipline of study without completing an honors degree. The Major and Minor modules, as well as the Specialization module, were introduced and available to students in non-honors degrees.

9. Are there any other units that teach microbiology courses, like Biology for example?

There are a number of courses taught by the Department of Biology that have relevance to Microbiology. These include:

Biol 1290B - Biology of Microorganisms - this is primarily taught to Food and Nutrition Students at Brescia College.

Biol 3218F/G - Biology of the Fungi

Biol 3332A - Parasitology

Biol 4218A - Microorganisms and Plant Disease

10. Can any student participate in International Exchanges or only those in the Scholar's Electives Programs?

Students do not have to be registered in the Scholar’s Electives Program to participate in an International Exchange. Approximately 6 – 10 BMSc students participate in the exchange program each year.

11. What courses will your new faculty member, the Undergraduate Education Asst.Prof., teach? Will there be a redistribution of teaching duties, if so what is the formula?

This remains to be determined depending upon the successful candidate although the individual will be heavily involved in teaching duties and curriculum review/development.
12. Tables 2.1.4, 2.1.5, 2.1.6 - does this include all students, including BSc students taking the MedSci modules?

Yes, the course enrolments, class averages and university course evaluations are for all students registered in the Microbiology and Immunology courses.

13. Which courses have TAs? What is the TA/student ratio? Are TAs also markers? How are TAs paid, by the hour? yearly stipend?

A centralized process for the allocation of GTAs for courses was developed by the Chairs of the basic medical science departments. The GTA union has defined the job descriptions and GTAs are assigned to the different responsibilities at the discretion of the instructor. Job descriptions include marking, proctoring, lab assistance, instruction, tutorial hours etc. The following guidelines are used when assigning GTAs:

1. For wet laboratory or computer courses, the ratio of teaching assistants (TAs*) to students should range from 1:10 – 1:12.
2. For lecture-dry laboratory/demonstration courses, the ratio of TAs to students should range from 1:30 – 1:40.
3. For lecture-tutorial courses, a sliding scale should be used for 200-level and above senior courses.
   - 0 – 50 students: no TA
   - 51 - 100 students: 1 TA
   - 101 - 250 students: 2 TAs
   - 251 – 500 students: 3 TAs
   - >500 students: 1 TA per 300 students

GTAs are hired for a certain number of hours for the term. In general, TAs involved in lecture courses are hired for 70 hours (5 hours/week) for the term. They are paid monthly at a rate of $32.50/hour plus 4% vacation.

14. Do the visiting speakers give their talks during times when most students can attend?

Yes. There are not undergraduate MI courses scheduled during the external seminars.

15. How often to students advisors/counsellors meet with each student/year or in their time in the programs?

Students initiate contact with either a departmental counselor, i.e. a faculty member in the Department of Microbiology and Immunology if they have questions about their Microbiology and Immunology courses or module, or a faculty academic counselor, i.e. one of the academic counselors on staff in the Dean’s Office, if they have broader questions about their overall academic performance, etc. Some students may not meet with either type of counselor throughout their entire program whereas other students might meet more frequently, at their request. Counseling is not mandatory for students.

16. Is there something like a Dean's Honour list designation for students achieving high yearly averages?

Students achieving an average of 80% or higher, with no failing grades, are eligible for the Dean’s Honor List.

17. What is a 'passing grade'?

A passing grade at Western is 50%.

18. I would like to know the break down in the number of students who enter the program at each year (after year1, after year2, etc) for each admission preference criteria. For example, how many enter after completing a full load in year one, how many entered who completed the 3.0 of principal courses, have average of 78%, etc.

The enrolment summary on page 3 (Section A - Bachelor of Medical Sciences Program) indicates the number of students in each year of the BMSc program. If we do not achieve our target number of 370 students satisfying ALL
the Admission Criteria, we relax certain Admission Criteria. This has recently been clarified on the BMSc website. Please visit [http://www.uwo.ca/bmsc/admission_criteria.html#admiss](http://www.uwo.ca/bmsc/admission_criteria.html#admiss) for further explanation.

For the 2009/10 academic session, 531 Year 1 students applied to Year 2 of the BMSc program with 300 of these students meeting all Admission Criteria including a minimum average of 78% on the first-year Biology, Chemistry and Math courses. An additional 44 students were admitted when certain Admission Criteria were relaxed. The majority of additional students were admitted by lowering the admission average to 75%.

437 students applied for entry into Year 3 of the BMSc program for the 2009/10 academic session. Of the 350 students currently registered in Year 3 of the BMSc program (we admitted more than 350 students but some either left Western or switched to other programs), 294 students met all the Admission Criteria including a minimum average of 78% on their best 3.0 foundation courses. An additional 56 students were admitted with relaxed admission criteria. Again, the majority of these additional students were admitted when the average in the foundation courses was reduced to 75%. A few students who had only completed 2.5 foundation courses were also admitted to Year 3 of the BMSc program.

19. Is it possible to see the raw data (comments) from students taking the exit survey (Appendix A2)?

These comments are attached at the end of the document.

Note the following course conversion numbers for the survey:

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<td>4300A</td>
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20. How do the course evaluations compare to those obtained in a comparable suite of courses, for example the Biochemistry courses?

Attached to the end of this document are the course evaluations for the Department of Biochemistry.

21. Appendix A5 lists the core facilities but I have no idea how many undergraduate students get to use these facilities during their degree (excluding summer research assistants or interns).

These facilities are available to students if their Thesis research requires access but they would not be used for any of the other undergraduate courses.

22. What provisions are there for students who have a bad first year, which is so common even for excellent students? Will they be able to appeal for entry into the Honours Specialization programs?

The full-year courses in Biology, Chemistry and Physics courses are being withdrawn and half courses are being introduced in September 2010 to replace them. The proposals currently being drafted to revise the Admission Requirements for entry into the various modules will include a minimum mark of 60% in each first-year half course (as opposed to a minimum mark of 65%). Students who do not achieve a minimum mark of 60% in each of these half courses will be required to repeat the first-year course.

Should a student achieve a minimum mark of 60% in each first-year course in Biology, Chemistry, Math and Physics, but not achieve an average of 78% (or 75% as the case has been) in the 3.0 Biology, Chemistry and Math
courses, registration in Year 2 would be in a Bachelor of Science (BSc) degree. The student could re-apply for the BMSc program in Year 3 and would be assessed using the Admission Criteria for Year 3 which does not include a minimum average in the first-year courses. During Year 2, the student would take the courses they need for the BMSc program which parallels those required for a BSc with a Major in Biology and a Major in Physiology, for example.

23. You specify a normal length of completion for the Major program being 4 years, what about the Honours programs? What is considered full time study for Honours versus Majors students? At UM we require a minimum of 4 courses per term for our Honours students and our Majors can take as few or many as they want.

The Honors Specializations take 4 years to complete, as well. The note regarding the Major was added so that students do not suffer from the impression that the 6.0 courses required for the Major in Microbiology and Immunology could be done over the span of Years 2 and 3. The inclusion of 4000-level courses in the Major in Microbiology and Immunology requires the completion of Year 4.

Regardless of the module in which students register, a full load of courses is considered to be five courses per term (= 5.0 for the Fall/Winter terms). Western considers a student to be a full-time student if 3.5 or more courses are taken over Fall/Winter terms.

24. Is it university policy not to allow students to ask questions during exams?

No it is not policy, but some instructors do not take questions during exams but space is given on the exam for comments about ambiguous questions.

25. Are faculty resources from the central admin during yearly budget allocations tied in any way to undergraduates in programs, in courses?

No. There is no money tied to undergraduate teaching that we are aware of except an Education Contingency Fund but this isn't very much Supervisors of Honor's thesis students also receive a $500 reimbursement for taking each student into their lab.

26. I am confused about admission requirements into the Honours programs. On the first page of Appendix A1 the 'minimum marks required for entry" is 65% in each of the 3.0 core courses while a little lower on the page under Admission Criteria it says they need an average of 78% on the same 3.0 core courses and on the next page under Note 3. it implies students need at least 75% on the same 3.0 courses. Which one is correct?

Students currently need to achieve a mark of at least 65% in each of their first-year courses in Biology, Chemistry, Physics and Math (as indicated above, this minimum mark is likely going to be reduced to 60% in each course). To reach the target number of 370 students in each of Years 2 and 3 of the limited enrolment BMSc program, an average of 78% is required on the 3.0 Biology, Chemistry, Math courses. This average is reduced to a minimum of 75% if we don’t reach our target number of 370 students during our initial adjudication (and we have gone down to an average of 75% for the past few years). To achieve the average of 75-78%, students must achieve marks higher than 65% in most of their first-year Biology, Chemistry and Math courses.

We used to accept the top 370 students into the program but students found this difficult to cope with – we would be asked by students whose mid-year marks in their first-year Biology, Chemistry and Math courses were in the 90’s if they would be in the top 370 students!
1. What led you to choose this program and how are you hoping to use it in your career?
   - Mic Imm 357a kept me interested
   - Previous outside exposure
   - Interest in career in infectious diseases
   - Mic Imm 221b in Year 2 – very relevant and applicable
   - 221b with Dr. Summers – found immunology fascinating and she was a great teacher
   - Great degree to have going into med school – we’ve discussed cancer, transplants, virology, bacteriology, autoimmunity, etc.
   - Really wanted to learn about immunology because I was told that it is the most important topic to understand in medicine
   - Hoping to use knowledge if I become a doctor
   - Initially wanted to study immunology to study more about cancer and HIV
   - Mic Imm maintained my interest
   - Really liked learning about the immune system – initially I hoped to pursue a career in research

Comments:
   - Courses:
     - 221b: Dr. Summers course had a well-organized and logical progression – started with basic principles and progressed to advanced concepts
     - It was nice to take a specific course, early in the senior years
     - Helped capture interest in a particular area and allow students to make informed choices
     - 357a: great instructors who didn’t assume background knowledge
   - Interest in research:
     - didn’t know this prior to Year 1 but started to enjoy research in Year 4
     - only get independence/authority over your own study in research course
     - lab courses provide preparation for research but they aren’t real research
   - relevance to future goals:
     - medicine: relevant area to study en route to medicine

2. What’s working well for you, in this program?
   - Thesis
   - Faculty
   - Departmental administrative team
   - Supportive friends in program
   - Dr. Cairns – funny and knowledgeable
- Dr. Mymryk – funny and passionate
- The class
- Research project was an excellent way to see what research would be like (more than lab courses)
- Advanced imm was my favorite course
- Thesis – responsibility, independence
- Strejan – funny and personable
- Dr. Summers, Dr. Cairns, Dr. Strejan, Dr. Morris
- All the immunology courses
- Awesome TAs and people in the lab for research project
- Material was very interesting
- Professors are very knowledgeable and passionate about their fields
- Great friends – supportive and close
- Courses with more immunology focus (advanced imm in Year 4) and also virology course that interest me
- Thesis
- Some really great profs
- My thesis project and Dr. Postovit
- Amazing friends I’ve made – Mic Imm is a small program so we all became close
- Courses are great (for the most part)
- Program size
- Bacterial pathogenesis and most Year 4 micro imm courses

Comments:

- People:
  - Enthusiastic and passionate
  - Impressed overall with the knowledge and passion that faculty have
  - Administrative staff are well-connected to the students
  - Friendship with other students – students share and help out in 340G
  - Program is small and there are no optional micimm courses and it is truly a shared experience, particularly in Year 4
- Thesis:
  - Ability to choose from a diverse range of projects is appreciated
  - Independence, self-directedness and responsibility for the first time
  - Depends on supervisor, however, as some tell students what to do too much
  - Thesis helps some students decide if they want to pursue research and helps others decide that they do not want to do research
  - DO NOT REMOVE THE THESIS
  - It is tough to really get into the thesis research when the course load is so heavy

3. What’s not working so well for you, in the program?
- Biochem 381a – Dr. Davies didn’t outline exam content very well
- No options for Year 4 courses
- Biochem 381a
- Mic Imm 4700b – too much genetics for me
- Communication between prof and student
- Resolving lab time, study time, work and play, when students are expected to be in the lab al lot
- Training in the lab and knowing responsibilities for the thesis
- Biochem 381a
- Mic Imm 361G (lab course)
- Stress of doing lab work as well as course work
- Different work attitudes from different supervisors
- Lack of goo intro course
- Not enough immunology
- Too much bacteriology
- Bacterial pathogenesis
- Timing experiments around courses – before 5:00pm and when other lab members are around
- 4 midterms for bacterial pathogenesis – too many midterms leaves too little time for thesis
- Lack of options for courses
- Only one immunology course in Year 4. There should be at least two (innate and adaptive)
- 220a – 2 full lab reports with no essay credit and they didn’t have past experience with lab reports
- Year 4 immunology organization
- Mic Imm 220a

Comments:
- Courses:
  - Recommend not taking Mic Imm 2100A until Year 3 – not a good introductory course and students shouldn’t take it if they haven’t yet completed Bio 2290F/G. Content wasn’t very relevant, too environmental
  - Biochem 381a – disconnected course; poor explanation of what would be on the exam, questions were misleading; a lot of Biochem for non-Biochem students; really focused on cellular level
  - Biochem 381a – a necessary evil but there was no application of techniques because they didn’t go onto do a Biochem lab; material is on par for Year 3 but could it be split off for Mic Imm students?
  - Not enough immunology – taught surface but not depth in imm; only 2 courses in entire program (U of T has a much stronger immunology program)
  - Too much bacteriology – immunology would recruit more students.
  - There should be more Year 4 courses so that students could focus more on either micro or imm
- TAs:
  - Should be more consistent in quality – some didn’t give guidance for writing up reports
  - Standardize the marking
  - TAs should be more accountable, more prepared and mark better
  - Didn’t always understand due to accents

4. What’s missing in the Program that you would have liked to see?
- Second year intro course that should be half micro and half imm
- More clinical-based courses and case studies from doctors
- Choice
- Immunology courses (cancer, etc.)
- A good introductory course in Year 2
- Clinical relevance
- More specific immunology courses (cancer, autoimmunity, transplantation, virally and bacteria-focused)
- Immunology (cancer, autoimmunity, graft response)
- Course options, especially in Years 3 and 4
- Immunology courses

Comments:
- Students would like to have a good introductory course in Year 2. This course should be a good summary of what students will see later.
- 221b would be a better recruitment tool than 220a (needs more immunology)
- More options for Mic Imm courses should be included
- The courses should show more clinical relevance

5. What relationship do you see among the different courses you are taking?
- Virology and immunology
- Like that there are so many directions I can go with this degree – this reflects the variety in the courses
- The courses don't seem to tie together
- Exams focus on memorization and not understanding – it's hard to apply past knowledge from 1st term to 2nd term courses
- Not a lot of overlap in courses, in general
- Not a lot from Year 3 to 4
- Immunology is very separate from micro – they could relate more
- Each professor from a particular course tries to recruit students into their field of study
- Environmental micro in Year 3 was not seen in Year 4 (thankfully) – why put so much emphasis on it in Year 3?
- Preparation for research, academia in general – heavy focus
- Promotes critical thinking and self-directed learning
- A relatively comprehensive Year 4 – interesting
- Can connect things learned in virology to immunology; not so much for bacterial pathogenesis or bac. Genetics

Comments:
- Microbiology vs. immunology – separate courses and it would be good to relate/integrate them more
- It would be helpful for instructors to talk/plan more – sometimes it feels like each topic within a course was separate but the students think they course be linked fairly easily

6. To what degree did your 2nd and 3rd year courses prepare you to handle the content of your 4th year courses?
- 220a prepared me for disappointment regarding 361G in terms of lab write-ups
- Clearly needed to review my notes
- 220a content didn’t help very much
- 290F/G didn’t prepare much for experiment designing and report writing
- 220a knowledge (or lack thereof) didn’t really prepare for any courses except for the bac. portion of 360b)
- Studying for 360b taught me how to study for 4th year
- 2nd year required courses were a good background (other than organic chem.)
- 3rd year virology was great preparation
- 357a was great preparation
- Mandatory classes for Grey unit in 290F/G were a terrible thing – I’ve never slept so often.
- Full lab reports helped with writing the thesis
- 221b and 357a prepared me well for advance imm (great foundation), while 220a and 360b did not prepare be well for 4th year bac. path (different foci)
- 357a was great preparation for 4th year immunology
- Workload in 2nd and 3rd year prepared me for 4th year
- Organic chem was not needed – I have never thought of resonance again
- 220a essentially useless in terms of learning to write reports
- 220a and 361G taught us techniques well but TAs were less helpful in teaching proper lab techniques and write-ups
- Organic chem was great for future understanding and conceptual awareness
- 290F/G – USELESS. It added stress and proved irrelevant for upper-year courses.
- Lab courses were not too relevant to actual research or thesis

Comments:

- Courses:
  o 220a - did a good job at teaching how to read scientific papers but wasn’t good preparation for other courses
  o 357a – whether students had 221b or not, 357a was great preparation since it started off general and then got more specific; exams were focused on understanding and application, rather than memorization
  o Write-ups for every lab course were different
  o Bio 290F/G – a good foundation; Grey unit could use some revamping – it was helpful but too lengthy and felt like a high-school unit; it should direct students as to how to write up a lab report
- Journals:
  o Exposure to journals in Year 2 would be helpful (perhaps in Bio 290F/G?) since lots of scientific information doesn’t come from texts
  o Perhaps a journal club in Year 3 could be struck
  o Some students still don’t know the difference between a good and a bad paper
  o Some students had to critique papers as part of their lab meetings for their thesis, which really helped
  o More exposure to the importance of figures in papers would be good, as would reading and then going through journal articles – this should be done by the end of Year 3

7. What guidance did you receive in selecting and progressing through this program and who provided it?
- Kathy Boon
Mrs. Boon
Talking to friends in upper years
Registrar website
Perusal of academic calendar
Talking to TAs
Lots of emails from BMSc office and also from professors in each course
Jean Brace very helpful in keeping us connected
Dr. Koval
Course professors and TA
Dr. Morris – talked me into doing a thesis
Faculty
Research project lab members

Comments:

- Students liked to be informed about processes, deadlines, prompts about the academic cycle
- Lack of knowledge of the Science counselors was very frustrating (lack of info re anything in Schulich)
- Students sought out the information but did get some thrown their way
- Think it would be good to speak with more upper-year students
- Would like to seek out info about future careers, but would like the resources to be readily available
- Liked to be invited to seminars and talks, and send email messages about what’s going on
2.1.6 University Course Evaluations
The course evaluation values (below) are reflective of student ratings of the “course as a learning experience”, with a maximum rating of 7.

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2.2 MEETING THE NEEDS OF THE STUDENT

The objectives of the program are to provide fundamental training in the principles of biochemistry and an element of research training as it applies to Biochemistry. A major goal is to provide sufficient training to allow students to progress towards careers as research scientists while at the same time provide a breadth of training suitable for students who will follow other career paths. Approximately 1/3 of the Biochemistry students go to professional school, 1/3 into graduate studies, and the remaining 1/3 into the workforce.

We have attempted to generalize the value of all our courses by focusing on the development of fundamental skills needed in all careers. It is also worth noting that we have encouraged students from other disciplines to take our courses by using class-room size as the only limiting factor for enrolment and by requiring only a limited number of prerequisites. This is particularly exemplified by the high levels of registration seen in courses such as 2280A, 3381A and 4410A. These courses (in particular 2280A) have enrolment from students from many faculties.