BMSc 2020
Planning Task Force White Paper
January 2011
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Executive Summary

Interest and enrolment in the Basic Medical Sciences courses and the Bachelor of Medical Sciences (BMSc) program is anticipated to continue to rise as the program becomes a "destination program" at Western. To foster and manage the growth of this destination program, while ensuring delivery of high-quality courses and program to an increased number of students, the BMSc 2020 Task Force has made the following general recommendations.

1. Maximize the existing capacity in the BMSc program and increase capacity, where possible, while maintaining the excellence of the program.
2. Increase the rigour of the Honors Specialization in Medical Sciences module (and re-name it the Honors Specialization in “Interdisciplinary Medical Sciences”).
3. Explore new (non-BMSc) modules with other non-traditional groups.
4. Develop a fast-track research-based MSc program.
5. Enhance the experience of BMSc students.
6. Hire a new faculty member (Education Coordinator) whose primary function will be teaching/coordinating a new 2000-level Medical Sciences course and the existing 4000-level Medical Sciences. This individual will gain expertise in e-learning and serve as a resource for all basic medical science departments and will chair the Education Committee and be an ex officio (voting) member of the BMSUE Program Committee.
7. Establish an Education/Curriculum committee to establish education goals, review departmental curricula, etc.
8. To achieve a tangible increase in e-learning course delivery, it is recommended that the university make substantial investment in establishing infrastructure and providing necessary resources dedicated for e-learning course development.
9. CRC’s have, as a component of their appointment, supervising students in the 4000 level research projects of their discipline-specific Honors Specialization modules.
10. Provide summer research course for students after their 3rd year to facilitate a fast-track Master’s program.
11. Provide additional e-learning opportunities to enhance the flexibility and ability for our students to enrol in the BMSc program offerings.
12. Increase the number of GTA’s to match the increased enrolment as well as to facilitate graduate recruitment.
13. Restructure organization for management of the Basic Medical Sciences, including the position of Vice-Dean Science (Academic).
14. Improve the use of existing classroom and laboratory space, and gain additional space.
15. Renovate the 2nd floor Dental Science laboratories to bring them up to a suitable standard for 21st century laboratory utility including e-learning capability.
A. Background:

After preparing for the Undergraduate Program (SUUPR) reviews of all modules offered within the BMSc program in the spring of 2010, Associate Dean, Doug Jones, decided that a review of the program components was required to set some long-term goals for Schulich’s basic medical science courses and the BMSc program. The original agreement between the Faculty of Science and the Schulich School of Medicine & Dentistry, updated in 2006 with considerable change in the counselling staff and organizational arrangements in the Faculty of Science office, included the statement that “A formal review of this agreement should occur by June 30, 2009.” This formal review was not undertaken.

In taking on the position of Associate Dean, Basic Medical Sciences Academic Affairs in July 2009, (revised from the position of Associate Dean, Basic Medical Sciences Undergraduate Education to reflect additional decanal responsibilities), Dr. Jones discussed the overdue review with Dean Herbert, along with potential modified terms of reference for the undergraduate program and structural changes. However, it was decided to await both the arrival of the new Dean of the Schulich School of Medicine & Dentistry (July 2010) and the SUUPR reviews of the undergraduate programs (2009/10 academic year).

The impetus for a review was fuelled by three additional factors. The first factor was the significant increase in first-year enrolment in the Biological and Medical Sciences first-entry program in the Faculty of Science for the 2010/11 academic year. A significantly greater than expected number of students accepted their offer of admission to the Biological and Medical Sciences first-entry program (ESM option through the Ontario Universities Application Centre), which resulted in more students in this first-year program than any other first-year program at Western for the 2010/11 academic year. 296 students accepted first-year offers of admission to Western above and beyond the target number of first-year students, with 234 of these additional students registering in the Biological and Medical Sciences first-entry program. The second factor was the recommendation in the External review of the Faculty of Science, for a review of the administrative structure of the BSc/BMSc program (see Appendix 1). The third factor contributing to a push for a review of the BMSc program was a comment in the SUUPR review of the BMSc Program (see Appendix 2), which indicated the need to address the enrolment issues with regards to the BMSc program and the widening deficit between the budget allocation for Graduate Teaching Assistants and the number of positions needed to support the undergraduate teaching.

Each of these contributing factors has resulted in several discussion/planning meetings. Doug Jones, Associate Dean Basic Medical Science Academic Affairs held several meetings with the Office of Institutional Planning & Budgeting (IPB), the Office of the Registrar, the Dean and Associate Dean (Academic) of the Faculty of Science, Dr. Carol Herbert (then the Dean of the Schulich School of Medicine & Dentistry) to explore how to manage the enrolment in the BMSc Program, which has clearly become a ‘destination program’ for Western. In addition, terms of reference were established for
an External Review of the programs administrative structure, which was held on October 4, 2010.

A planning workshop was held on September 30, 2010 to which the Deans of Schulich and the Faculty of Science, and the Chairs and Undergraduate Chairs of the Basic Medical Science departments were invited, along with the BMSUE staff, the Chief Operating Officer of Schulich, the Associate Deans (Academic) of the Faculties of Science, Health Sciences, the Richard Ivey School of Business, and Engineering, and representatives from the Teaching Support Centre (see Appendix 3). The goal of the planning workshop was to provide initial information and direction for a Taskforce composed of the following members:

- **Chris Brandl**, Department of Biochemistry
- **Kathy Boon**, Program Coordinator, BMSUE
- **Keith Griffiths**, Associate Dean Academic, Faculty of Science
- **Jon Hore**, Vice-chair, Department of Physiology & Pharmacology
- **Doug Jones** (Chair), Associate Dean, BMSAA, SSMD
- **Zia Khan**, Acting Undergraduate Chair, Department of Pathology
- **Peter Merrifield**, Department of Anatomy & Cell Biology
- **Abbas Samani**, Undergraduate Chair, Department of Medical Biophysics
- **Mark Speechley**, Undergraduate Chair, Department of Epidemiology & Biostatistics
- **Tom Stavraky**, Undergraduate Chair, Department of Physiology & Pharmacology
- **Kelly Summers**, Department of Microbiology & Immunology

The Task Force met as a committee five times in 2010, and twice in 2011. The four sub-groups of the Task Force met separately between committee meetings and each focussed on one general area. This ‘White Paper’ is the culmination of their input and discussions. Many of the recommendations suggested in this ‘White Paper’ were influenced by financial implications as well as the Council of Ontario Universities Position Paper – June 2010 (Framework for Planning and Funding of Enrolment). The general areas on which these sub-groups focussed were:

- Program Expansion and Quality Enhancement
- Space/Facilities Needs
- Personnel Resources
- Organization, which are presented below in sequence

### B. Program Expansion and Quality Enhancement:

**Assumptions:**

- a. The goal of the province is to increase enrolment in post-secondary enrolment by approximately 25%.
- b. The BMSc program will remain a high-demand “destination” program at Western
- c. The goal of the Faculty of Science and the Schulich School of Medicine & Dentistry is to maintain the high quality of education in the BMSc Program (or improve it).
d. Schulich will continue to have a sufficient number of faculty members with research-intensive programs to support fourth-year students in undergraduate research projects.

1. **Maximizing the existing capacity and increasing capacity in the BMSc program, while maintaining excellence:**

The current capacity in Year 4 of the Honors Specialization modules is indicated in Table 1, as is the enrolment over the past six years. The new “Index Year” for Western is the 2009/10 academic year and it forms the “base number” in planning for 2020.

**Table 1: History of enrolments in Honors and Majors by program**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Honors Specialization (HSP) Biochemistry</td>
<td>30</td>
<td>39</td>
<td>37</td>
<td>24</td>
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<td>2</td>
<td>3</td>
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<td>4</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>5</td>
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<tr>
<td>HSP Medical Biophysics</td>
<td>20</td>
<td>7</td>
<td>18</td>
<td>12</td>
<td>5</td>
<td>9</td>
<td>6*</td>
</tr>
<tr>
<td>HSP Medical Cell Biology</td>
<td>6</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>HSP Medical Sciences</td>
<td>120</td>
<td>65</td>
<td>109</td>
<td>98</td>
<td>102</td>
<td>99</td>
<td>109</td>
</tr>
<tr>
<td>HSP Medical Sciences / HBA</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>8</td>
<td></td>
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<tr>
<td>HSP Microbiology and Immunology</td>
<td>32</td>
<td>33</td>
<td>30</td>
<td>17</td>
<td>25</td>
<td>20</td>
<td>23</td>
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<tr>
<td>HSP Pathology and Toxicology</td>
<td>15</td>
<td>5</td>
<td>12</td>
<td>10</td>
<td>9</td>
<td>6</td>
<td>14</td>
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<tr>
<td>HSP Pharmacology</td>
<td>70</td>
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<td>11</td>
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<td>43</td>
<td>26</td>
<td>35</td>
<td>40</td>
<td>48</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>HSP Physiology and Pharmacology</td>
<td>5</td>
<td>33</td>
<td>19</td>
<td>13</td>
<td>14</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td><strong>Totals in Honors Specialization Modules</strong></td>
<td><strong>314</strong></td>
<td><strong>212</strong></td>
<td><strong>299</strong></td>
<td><strong>248</strong></td>
<td><strong>252</strong></td>
<td><strong>257</strong></td>
<td><strong>286</strong></td>
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<tr>
<td>Specializations</td>
<td>77</td>
<td>114</td>
<td>126</td>
<td>37</td>
<td>11</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Double Majors - Honors</td>
<td>1</td>
<td>74</td>
<td>84</td>
<td>50</td>
<td>20</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Double Majors - 4-year</td>
<td>1</td>
<td>51</td>
<td>13</td>
<td>20</td>
<td>12</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

With a proposed increase in demand of at least 25% for post-secondary education within the next few years, it is recommended that the enrolment in Year 4 of the BMSc Program be increased to approximately 450 students. To achieve an enrolment of 450 students in Year 4, it is recommended that:

- approximately 500-525 students be admitted to Year 2 beginning in 2011/12
- approximately 475-500 students be admitted to Year 3 beginning in 2012/13
- the increase in enrolment in the BMSc Program be accommodated by:
  - increasing the capacity of the Honors Specialization in Medical Sciences from 120 to 180 students. One extra section of Medical Sciences 4900 can be offered
in first term (4900F), with space for 30 additional students, and a second extra section can be offered in second term (4900G), with space for 30 additional students.

- increasing the number of spaces available for students in the 4000-level research projects.
- accommodating the need for any additional increase in enrolment within the Double Major option in the BMSc Program. There is concern that the combination of a Major in Medical Sciences with a discipline-specific Major is not sufficiently rigorous to be worthy of a BMSc (Honors) designation and it may be recommended that the Major in Medical Sciences be excluded from the Double Major option within the BMSc Program. A new Major in Interdisciplinary Medical Sciences may be introduced and available only to students in the Double Major option in the BMSc Program. This new Major could include 4000-level courses from the Basic Medical Science disciplines.

This increase in enrolment should be reviewed in five years to determine whether or not the enrolment target should be further increased. Increased enrollment, should it be required beyond 450 students in Year 4 in the latter half of the planning period, will be accommodated through the development of new modules in emerging areas, additional collaborative modules, and through double majors. Trends as well as innovative initiatives will be followed in the early years and expansion created in strategic areas.

To maintain the quality of students within the BMSc program, it is recommended that:

- a minimum average of 75% formally is required for admission to and progression within the BMSc Program. Currently, a minimum average of at least 75% is required for both admission and progression but is stated only on the BMSc website and not in the Academic Calendar.
- only those students registered in Year 3 of the BMSc Program in 2012/13 be permitted to progress to Year 4 in 2013/14 (anticipated enrolment of 450).

2. Increasing the rigour of the Honors Specialization in Medical Sciences module (and re-naming it):

Many students in the BMSc program aspire to become physicians. Those who are not interested in completing a 4000-level project course avoid the discipline-specific Honors Specialization modules and pursue the Honors Specialization in Medical Sciences. There is concern, however, about the rigour of the current Honors Specialization in Medical Sciences module and it is felt that students often make “soft” choices rather than the choices that will facilitate their career development. The suggestion is that the module be re-named as the Honors Specialization in Interdisciplinary Medical Sciences and that the rigour of the module be increased by:

- mandating that courses from three disciplines be required in Year 3 so that the module is truly interdisciplinary and that these courses be selected from the “core” courses offered by the various departments;
- requiring four half courses at the 4000-level from more than one of the disciplines (i.e. introduce a discipline requirement into fourth year);
• enhancing Medical Sciences 4930F/G: Selected Topics in Medical Sciences to help meet University Undergraduate Degree Level Expectations (UUDLES) criteria (see Appendix 4). This course should be integrated more effectively with the lab course (Medical Sciences 4900F/G). A specific individual should be hired on a 5-year renewable, limited term, to run and teach this course, and this individual should work with the Lab Coordinator to ensure integration between the two Medical Sciences courses. The same individual should also teach and co-ordinate a new comprehensive 2000-level year courses (see Principles of Disease in #5 Enhancing the Overall Experience). This individual will be hired principally on criteria of teaching excellence.

• requiring at least one of the laboratory courses in Year 3 that are mandatory in the discipline-specific Honors Specialization modules. The vast majority of students currently registered in Year 4 of the Honors Specialization in Medical Sciences have completed at least one of these courses (Anatomy and Cell Biology 3309, Biochemistry 3380G, Microbiology and Immunology 2100A, 3600G, Pharmacology 3580Y and Physiology 3130Y). Table 2 indicates the current capacity in the lab courses, as well as the current enrolment.

Table 2: Capacity and enrolment in Basic Medical Science laboratory courses (2010/11)

<table>
<thead>
<tr>
<th>Lab course</th>
<th>Capacity (2010/11)</th>
<th>Enrolment (2010/11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy and Cell Biology 3309</td>
<td>260</td>
<td>168</td>
</tr>
<tr>
<td>Biochemistry 3380G</td>
<td>96</td>
<td>76</td>
</tr>
<tr>
<td>Biochemistry 3387G</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Medical Biophysics 3970Z</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>Microbiology and Immunology 2100A</td>
<td>162</td>
<td>156</td>
</tr>
<tr>
<td>Microbiology and Immunology 3600G</td>
<td>60</td>
<td>35</td>
</tr>
<tr>
<td>Pharmacology 3580Y</td>
<td>100</td>
<td>34</td>
</tr>
<tr>
<td>Physiology 3130Y</td>
<td>180</td>
<td>178</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>908</strong></td>
<td><strong>685</strong></td>
</tr>
</tbody>
</table>

3. Exploring new modules:
It would be advantageous to create interdisciplinary modules to provide students with additional career opportunities and attractive alternatives to the Honors Specialization modules currently offered within the BMSc Program. Examples of faculties, schools and departments that could be involved in a joint effort include, but are not limited to:

• Media Information and Technoculture (MIT): students could be well-trained in scientific writing, presentation and communication skills, etc. so that they could pursue careers in scientific reporting, documentary production, etc.

• Kinesiology: a joint module with Medical Biophysics could build on biomechanics offerings; a combination with the Medical Sciences could provide a broader perspective.
• Computer Science, perhaps by improving the Bioinformatics program. The growing initiative to allow alternative Science courses in the first course selection may allow more students to sample Computer Science courses in first year
• Combined BMSc/Law program
• Concurrent BMSc/Engineering degrees
• Consider expanding the combined BMSc/HBA program to include the discipline-specific Honors Specialization modules
• Biology and Basic Medical Sciences
• Interdisciplinary Life Sciences (Basic Medical Sciences, Biology, Environmental Sciences, Health Sciences)
• Articulation agreements with Colleges of Applied Arts and Technology (CAATs)

New modules currently in the planning/approval process include an Honors Specialization in Chemical Biology (BMSc), Honors Specialization in Neuroscience (BMSc), and an Honors Specialization in Computational Biochemistry (BMSc). A Major in Pathology is in the discussion phase within the Department of Pathology.

4. Developing a fast-track MSc program:

It is recommended that a fast-track research-based MSc program be developed that would begin after third year. Students would begin the program during the summer after third year, take a complete fourth year, continue in the summer after fourth year and complete a final full Masters year. Students would graduate with two degrees: BMSc (with a discipline-specific Honors Specialization module) and an MSc. A higher tuition could reasonably be charged in Year 4 in the fast-track MSc program

Professional Masters Programs are becoming increasing popular in the United States which combines courses in the science specialization and courses in entrepreneurship, technical writing, finance, communications, etc. Team- and project-based courses are offered, as well as industry internships in many of the programs. A Canadian example of the Professional Master’s Program can be found at The University of Toronto (Mississauga) which offers a Master of Biotechnology Program: a 2-year, course-based professional degree incorporating both science and business courses with 8-12 months of work experience in the biotechnology and biopharmaceutical sectors. Developing such a program at Western would be challenging, requiring an active non-science partner(s), industry connections for internships, and enthusiasm from the faculty.

5. Enhancing the overall experience of BMSc students:

To enhance the numbers of students attracted to the BMSc program, we must enhance the student experience within the program. Suggestions to accomplish this enhancement include:

• Increase the statistical knowledge and writing skills of BMSc students. The relevance of Biology and Statistics 2244A/B should be explored for BMSc students in an effort to determine whether offering to co-teach these courses or replacing them with two new half courses would improve the experience for BMSc students. Sample course outlines for two new half courses (Scientific Reasoning and
Communication 1 and 2, [SCR1&2]) can be found at the end of this section. SCR1 would be required in second year and SCR2 would be required to be completed by the end of the third year.

- Introduce a 2000-level half course that would serve as an introduction to the Basic Medical Science disciplines. This course would be mandatory for all BMSc students and have the capacity to accommodate enrolment by students from other faculties. A suggestion title and course description for this course is as follows:

  **Principles of Human Disease:** The course in its initial offerings will explore the biology of the disease Diabetes Mellitus and avenues for its treatment from the perspective of all medical science disciplines. The scope will include analysis ranging from epidemiology to molecular biology. The course will emphasize scientific approaches to problem solving and critical thinking.

- Review the format of the 3000-level laboratory courses offered by the Basic Medical Science departments and make adjustments to ensure that all BMSc students receive similar training in reviewing/critiquing the original literature, writing/communication, hypothesis generation and laboratory skills, regardless of the lab course taken. Doing so would bring the Double Major option completed within a BMSc Honors degree more in-line with the University Undergraduate Degree Level Expectations (UUDLES).

- Encourage development of e-learning with the goal of introducing on-line courses, where appropriate, in which the quality of the experience will not be compromised.

- Encourage development of online sections of high-demand lecture courses so that students have the option of an online experience as is the case with Physiology 2130 (offered on-campus and online).

- Mandate teaching as a priority for all faculty members (Canada Research Chairs should be involved in supervising the 4000-level undergraduate research projects). This should be evaluated at the Annual Performance Evaluation and for Promotion and Tenure. Along with this, and specifically recognizing that funds are required for research projects, faculty (PIs) that supervise Year 4 students in undergraduate research projects should be provided with the required funds to do so. This would allow for expansion in the discipline-specific Honors Specialization modules.

- Enhance and actively promote teaching excellence. Matching the skills of lecturers to the level of course (and size of class) would assist in achieving teaching excellence. It is critical that excellent teachers be involved in courses that first introduce students to the disciplines, as well as courses at the intermediate and advanced level. Experienced lecturers should mentor junior faculty members and all should be involved in teacher training.

- Train Graduate Teaching Assistants (GTA’s) to critically edit written work. They will then be able to pass on key elements to the undergraduate students whom they assist.

- Enhance the communication to students about symposiums, academic and career events, research opportunities, etc.

- Offer summer programs, (educationally-based and research-based)

- Provide meeting areas for social interactions and study groups

- Make better use of the Valberg Educational Resource Centre (VERC) for BMSc students
• Create a culture that includes the BMSc students in the Schulich School of Medicine & Dentistry so that they have a greater sense of belonging.

• Holding 3000- and 4000-level basic medical sciences courses in both the Medical Sciences (MSB) and Dental Sciences Building (DSB) would be ideal for BMSc students in terms of creating a greater sense of belonging to Schulich. Unfortunately, some of the 3000-level courses have an enrolment of 200 or more students and the largest classroom in either building can hold a maximum of 105 students. 3000- and 4000-level courses with enrolment of 105 students or less are difficult to schedule in both MSB and DSB as the students in MD (medicine) and DDS (dentistry) are given preference.

• Dentistry lectures are scheduled on the hour, as opposed to the half hour which adds to the scheduling difficulties. Often classrooms are vacant for half hour periods.

• A recommendation should be made to improve classroom scheduling in both buildings by increasing the availability of lecture rooms for Basic Medical Science courses and bringing the Dentistry schedule into line with the rest of campus.

6. DRAFT Proposed new BMSc courses: Scientific Reasoning and Communication (SRC1 A/B and SRC2 A/B)

Rationale and Objectives:

• Replace existing traditionally taught statistics course(s) while preserving key concepts
• Enhance skills in technical writing
• Teach fundamentals of critical thinking
• Integrate formal statistics teaching with applied scientific reasoning and communication
• Place emphasis on practical applied skills over theoretical understanding
• Emphasize common scientific elements from laboratory to population approaches

Key concepts:

1. Introduce research controversies (e.g.):
   ▪ Does Drug A reduce blood pressure better than Drug B? How?
   ▪ Does Virus X cause Cancer Y? How?
   ▪ Does ‘liberation therapy’ improve symptoms in MS? How?

2. Studying questions at different levels of detail:
   ▪ Identifying risk and protective factors vs. understanding biomedical mechanisms
   ▪ Human vs. animal models

3. Specifying research questions in an answerable form
   ▪ Questions of difference between groups
   ▪ Questions of association between variables

4. Hypotheses: (Null and Alternate). The role of chance and random processes. Type I and Type II error. Testable predictions.

5. Data:
   ▪ Types of variables and Levels of measurement
   ▪ Fundamentals of data collection.
     • Validity and reliability
• Methods of data collection (e.g. lab vs. questionnaire), similarities and differences
6. Errors: Sampling and measurement, random and systematic
7. P values versus confidence intervals: correct and incorrect interpretations
8. Major statistical tests of difference
   ▪ Means (t-test, ANOVA)
   ▪ Proportions (chi squared; Fisher)
9. Statistical tests of association
   ▪ Means (correlation and regression)
   ▪ Proportions (Odds and Risk ratios)
10. Causal attribution and confounding
    ▪ Principal strategies to minimize confounding
11. Graphical and tabular presentations of statistical findings
    ▪ How to read a table; common errors in presentation
12. Technical writing
    ▪ Steps in writing an abstract
    ▪ Editing for clarity and brevity
13. Rhetoric
    ▪ Uses and abuses of scientific research findings
    ▪ In whose interest?: ‘self’ versus ‘public’

C. Space/Facilities:
This section presents recommendations for extra space required by the BMSc program to accommodate an increase of approximately 25% in post-secondary domestic enrolment. Given the drive for substantially increasing international student enrolment by Western, this document also considers a 5% increase in international student enrolment. It is important to recognize that not all students taking Basic Medical Science courses and laboratories at the 2000-, 3000- and 4000-level will be registered in the Honors Specialization modules offered within the BMSc program. Registration in the various Majors offered by the Basic Medical Science departments does not require registration in a BMSc degree. Although control over enrolment within the BMSc program will be maintained, control over registration in Major modules outside the BMSc program will likely not be possible.

Information was acquired from each Basic Medical Science department and the BMSUE Office (representing the Medical Sciences modules) to estimate the space required for expansion. This information indicates that the departments/Medical Sciences program can accommodate approximately 438 students in Year 4 of the Honors Specialization modules by the year 2020. The Drimmer Family Teaching Laboratory schedule and course enrolment information were also obtained from the BMSUE Office. Based on the information provided, the Drimmer Labs are sufficient to accommodate the increase deemed acceptable by the Basic Medical Science departments and the Medical Sciences program. This conclusion is based on the assumption that Dental Sciences Building (DSB) 2007, 2010 and 2016 labs continue to be available, although renovation of these labs is needed. Classroom space requirement estimation is complex as it depends on several factors including whether or not the university classroom space is
currently used optimally. An additional consideration is the provision of sufficient web-based facilities and support for both the course requirements and for the student use of personal computers and/or PDA devices.

**Basic Medical Science departments/program information:**

Each Basic Medical Science department/Medical Sciences program was asked to answer the following questions:

1. Guestimate the number of Year 4 students your department will accept (out of the 450 Year 4 BMSc students).
2. State how much laboratory space you currently have (other than the Drimmer Labs) and indicate whether it is shared with other departments.
3. How much extra laboratory space will you need, based on your estimation in 1?
4. With the estimated extra enrolment by 2020, would current assigned class rooms be still suitable for your courses?
5. If your answer to 4 is No, how much extra class room space (in percentage) would you require to accommodate your estimated growth?

Answers obtained from each department in addition to input from the BMSc program staff was processed and is summarized in Table 3. The last column of this table indicates anticipated percentage increase of student enrolment in Year 4 of the Honors Specialization (HSP), Specialization (SP), and Major (MAJ) modules. The departments provided the maximum capacity in the Honors Specialization modules whereas the “Anticipated Year 4 Enrolment in Specialization and Major modules” was calculated by assuming a 25% increase in these modules by 2020.

**Table 3: Current and anticipated Increase in enrolment in Year 4 modules**

<table>
<thead>
<tr>
<th>Department</th>
<th>Current Year 4 Enrolment in HSP module</th>
<th>Maximum Capacity deemed acceptable by departments in Year 4 HSP module by 2020</th>
<th>Current Year 4 Enrolment in SP and MAJ modules</th>
<th>Anticipated Year 4 Enrolment in SP and MAJ modules by 2020</th>
<th>Average 4th Year (HSP/SP/MAJ) Course Enrolment Increase (%) (accounting for 5% increase for internationalization)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy &amp; Cell Biology</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>18.75</td>
<td>30%</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>34</td>
<td>54*</td>
<td>15</td>
<td>18.75</td>
<td>51%</td>
</tr>
<tr>
<td>Medical Biophysics</td>
<td>9</td>
<td>30</td>
<td>4</td>
<td>5</td>
<td>178%</td>
</tr>
<tr>
<td>Medical Sciences</td>
<td>116</td>
<td>180</td>
<td>128</td>
<td>160</td>
<td>41%</td>
</tr>
<tr>
<td>Microbiology &amp; Immunology</td>
<td>28</td>
<td>37</td>
<td>14</td>
<td>17.5</td>
<td>31%</td>
</tr>
<tr>
<td>Pathology</td>
<td>14</td>
<td>15</td>
<td>0</td>
<td>30**</td>
<td>233%</td>
</tr>
<tr>
<td>Physiology &amp; Pharmacology</td>
<td>77</td>
<td>100</td>
<td>53</td>
<td>66.25</td>
<td>29%</td>
</tr>
</tbody>
</table>

* includes proposed Honors Specialization in Chemical Biology

** includes Major in Pathology (in discussion phase)
To predict anticipated needs for laboratory space for 2020, all 2000- and 3000-level lab courses offered by the Basic Medical Science departments were considered. Current enrolment in each of these courses was extracted and broken down in terms of student population in each department/module. To estimate the enrolment in each of these lab courses for 2020, we assumed that the HSP student population increases according to the data given in Table 3. Other student population components including Specialization, Major and Minor in Basic Medical Science departments, Medical Sciences and other programs were assumed to grow by 25%. Current enrolment in the lab courses, their corresponding current capacity, and the labs used are given in the second, third and fifth columns of Table 4. The fourth column of this table provides estimated data for the anticipated laboratory spaces need for 2020.

Table 4: Current and anticipated increase in laboratory space requirements in Basic Medical Science courses

<table>
<thead>
<tr>
<th>Lab course</th>
<th>Capacity (2010/11)</th>
<th>Enrolment (2010/11)</th>
<th>anticipated need for Lab Space in 2020</th>
<th>Lab used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy and Cell Biology 3309</td>
<td>260</td>
<td>168</td>
<td>204</td>
<td>Drimmer; DSB 2007</td>
</tr>
<tr>
<td>Anatomy and Cell Biology 3319</td>
<td>250</td>
<td>278</td>
<td>415</td>
<td>DSB 2007</td>
</tr>
<tr>
<td>Biochemistry 3380G + 3387G</td>
<td>114</td>
<td>92</td>
<td>160</td>
<td>Drimmer</td>
</tr>
<tr>
<td>Medical Biophysics 3970Z</td>
<td>32</td>
<td>22</td>
<td>55</td>
<td>Drimmer</td>
</tr>
<tr>
<td>Microbiology and Immunology 2100A</td>
<td>162</td>
<td>156</td>
<td>205</td>
<td>Drimmer</td>
</tr>
<tr>
<td>Microbiology and Immunology 3600G</td>
<td>60</td>
<td>35</td>
<td>51</td>
<td>Drimmer</td>
</tr>
<tr>
<td>Pharmacology 3580Y</td>
<td>100</td>
<td>34</td>
<td>46</td>
<td>DSB 2007 and 2010</td>
</tr>
<tr>
<td>Physiology 3130Y</td>
<td>180</td>
<td>178</td>
<td>236</td>
<td>DSB 2007 and 2010</td>
</tr>
<tr>
<td>totals</td>
<td>1158</td>
<td>963</td>
<td>1372</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 indicates that most labs, except Anatomy and Cell Biology 3319, will grow moderately such that enhanced scheduling and adding a small number of lab sections is sufficient to absorb the forecast increase. Note that Anatomy and Cell Biology 3319 is not a mandatory course in any of the Honors Specialization modules offered within the BMSc program; however, it is a popular course and has a laboratory demonstration component which requires considerable resources. The course currently has a capacity of (and enrolment of) 250 students. Increasing this capacity to over 400 is feasible by adding an extra lab session in addition to online offerings. For the extra lab session, an extra 4 hour session can be held in Dental Sciences Building 2007 on each Tuesday. Also, the Department of Anatomy and Cell Biology is planning to offer this course as both an in-class and online course within the near future.

Extra Laboratory Space:

According to the current Drimmer Lab schedule, the Departments of Biochemistry and Medical Biophysics and the Honors Specialization in Medical Sciences are able to...
absorb the forecast increase in laboratory space requirements by having more balanced enrolment in their lab sections. While efficient, this solution may limit the scheduling choices that students currently enjoy. The Department of Anatomy and Cell Biology may comfortably absorb 50 students into section 003 of Anatomy and Cell Biology 3309. Beyond that, the Department of Anatomy and Cell Biology may need to add an additional section with small enrolment on either Friday afternoon or any morning of the week. The Drimmer Lab schedule indicates that the labs are not used from 8:30 a.m. to 11:30 p.m. approximately 25% of the time. The Department of Microbiology and Immunology needs to add another lab section for Microbiology and Immunology 2100A. This section may fit either on Friday afternoon or any morning of the week. Moreover, the laboratories in Dental Sciences Building (DSB) 2007, 2010 and 2016 are not fully utilized and can accommodate a larger number of students in labs offered by Anatomy and Cell Biology, Medical Sciences and Physiology & Pharmacology, if they are properly renovated. It is feasible that the Drimmer Labs, in addition to the DSB labs, can be more fully utilized to accommodate the expected enrolment increase. However, this efficient way of enrolment increase accommodation may lead to lab course scheduling difficulties, particularly to ensure sufficient set-up time and removal time when laboratories are shared. Furthermore, the DSB 2007-2010 laboratories have been recognized for some time to require renovation to bring them “into the 21st century”, and to accommodate the forecast larger number of students.

Considering the anticipated significant role of e-learning in various courses, including lab courses, it is necessary that labs be equipped by dedicated infrastructure and devices necessary for effective internet access.

The Drimmer labs were initially designed for use of the BMSc program labs but are currently being used by Schulich’s professional programs (Medicine and Dentistry) due to space limitations. This restricts the availability of the Drimmer Lab to accommodate expansion of the Basic Medical Science labs, particularly when the use by the professional programs, although brief, overlaps both the first and second terms. Increasing the use of the Drimmer Lab for students in the BMSc program will require Schulich Dentistry to find laboratory space elsewhere. Currently, Dentistry uses one room within the Drimmer Lab for one morning a week in first term. In second term, Dentistry books this room for one morning a week but uses the lab only in January and other labs cannot be held in this room for February, March and April.

**Extra Classroom Space:**

All departments estimated an increase of at least 25% in their course enrolments. This estimate takes into account an increase in modules offered both within the BMSc program and those that may be taken by students registered in other programs, in addition to enrolment increase in other modules (e.g. Biology modules) to which the departments provide course service. As indicated earlier, it is very difficult to estimate the extra classroom space required to accommodate this forecast increase in course enrolment. Many courses, especially those with high enrolment, are held in classrooms for which the enrolment is less than half of the classroom’s capacity. The extra classroom space that will be required is strongly dependent on how efficiently
classroom assignment is carried out. A change in scheduling must occur to optimize classroom space. Classes offered more than once a week must be scheduled either on a Monday-Wednesday-Friday or Tuesday-Thursday pattern and at the same time each day. Examples of Basic Medical Science courses that could increase enrolment, based on the capacity of the room in which they are currently offered are below:

a. Anatomy and Cell Biology 3319: Current enrolment is 268 students. This course is currently held in Social Science Centre Room 2050 which has a capacity of 448 students. This particular classroom can accommodate course an increase in enrolment of 40%. The capacity in the lab sessions, however, is likely a more limiting factor for overall enrolment than the capacity in the lecture session.

b. Biochemistry 2280A: Current enrolment is ~1100 students, divided into two sections held in North Campus Building Rm 101. An increase of greater than 40% may require adding a third section, if scheduling allows. The estimation is somewhat complex since approximately 25% of the students enrolled in the course are registered in programs other than BMSc/Biology programs.

Another approach to estimate the required extra classroom space can be taken based on the anticipated 25% increase in enrolment across the province for domestic students and the anticipated 5% increase in international student enrolment. By assuming that this increase will be absorbed by all Ontario universities uniformly and that BMSc will absorb an equal share of this increase within Western, a 30% increase in classroom space will be required if the current level of under-utilization of classroom space continues. The variable distribution can always be absorbed by proper classroom assignment, which is done centrally. In conclusion, the amount of extra classroom space required for an expanding BMSc program is estimated between 0 to 30% of the current space.

Other Considerations:
The above analysis is based on a total fourth year BMSc domestic enrolment of 500 students by 2020. Note that lab space and classroom space were not assessed solely based on enrolment in Honors Specialization, Specialization and Major modules. More realistic numbers, based on all courses including service courses, were used in the analysis. Another issue impacting the need for increased classroom and lab space is the modality in which courses are delivered. The present analysis uses the current figures and assumes that the delivery modality will remain unchanged, i.e. the analysis assumes that the current online courses will continue to be delivered online and no other traditional courses will switch to online modality. While this assumption is conservative, we do not anticipate that many courses will adapt an online delivery unless there is a dramatic change in the level of e-learning resources and support at both the University and Faculty level. This forecast stems from two reasons. First, developing online courses is a very heavy undertaking that requires significant resources that the University currently lacks on a large scale. With the University’s current resources and infrastructure, it is estimated that developing a high quality online course typically takes 3 years before it can be launched.
Enhancing our University’s international image involves both increasing international student enrolment as well as sending Western’s BMSc students to other highly-recognized international universities. E-learning style courses could play a significant role in enhancing Western’s internationalization. By increasing the number of courses delivered online, international students would have additional opportunities to begin their studies at Western while still residing in their home countries. Moreover, it would be advantageous for Western students studying abroad to maintain access to courses offered online at Western and provide options for domestic students with time conflicts.

To achieve a tangible increase in e-learning course delivery, it is recommended that the university make substantial investment in establishing infrastructure and providing necessary resources dedicated for e-learning course development. Considering the significant role that is anticipated of e-learning in various courses including classrooms, it is necessary that classrooms be equipped by dedicated infrastructure and devices necessary for effective internet access.

To increase enrolment, updating both lecture and laboratory facilities/equipment is needed to modernize the space used by the BMSc program for the 21st century.

Physical Space Requirements for Basic Medical Sciences Undergraduate Education (BMSUE) Office:

Office space is required for the following members of the BMSUE Program:

- **Associate Dean (currently no space within the BMSUE Office)**
- **Education Coordinator (new position and would require office space)**
- **Program Coordinator (has space within the BMSUE Office)**
- **Administrative Assistant/Officer (has space within the BMSUE Office)**
- **Laboratory Coordinator (has an inappropriate space within a lab/office of the Department of Biochemistry)**

Meeting space:

- **Board room for 15 people**

Student space (potential for 800+ students in Years 3 and 4 BMSc):

- **Large meeting space would be advantageous for students (twice the size of Health Sciences Addition 101) for approximately 100 students to gather at a time (networking, focus groups, study groups, mentoring, socializing). The new building for HBA (Business Administration) will contain several meeting areas for students, both formal and informal such as a dining pavilion, a garden quadrangle, and informal meeting areas on the lower level.**

Service space:

- **Reception/waiting/display area (at least 6 chairs) with a counter**
- **Storage area**
Figure 1: Architectural Proposal for Renovation/Addition to MSB

Ideal location for the BMSUE Office is indicated by the red circle

D. Personnel Resources:

Shift in structure and resource emphasis:

To meet the personnel resource needs for 2020, the Task Force evaluated the need for both increasing quantity of teachers, while maintaining or enhancing the quality of the program by both Professors and TAs in response to the increased number of students predicted to be entering this program over the next 10 years. An initial consideration was the prediction that there will be considerable pressure brought to bear on the Medical Science laboratory course (Medical Science 4900F/G), currently coordinated by the Associate Dean, Dr. Doug Jones. The Associate Dean also coordinates the Medical Sciences 4930F/G companion lecture-based course and the Medical Sciences 4100F/G Laboratory Animal Pathology course. It was felt to be inappropriate for a person holding this position to also be responsible for specific undergraduate BMSc courses. Thus, to relieve this responsibility of coordinating these courses, it is recommended that a full time faculty member be hired on a limited term contract (renewable five-year, rolling term). This is a non-traditional recruitment category, but one with some precedence in Schulich. For example, Dr. Marjorie Johnson in the Department of Anatomy and Cell Biology was recruited on a five-year rolling contract which has been renewed several times. Other faculty members with similar limited term contracts include Derek
McLachlin (Biochemistry), Kelly Summers (Microbiology and Immunology), Anita Woods (Physiology and Pharmacology) and Tom Stavraky (Physiology and Pharmacology).

There would be an increased role for this position in addition to the 4000-level Medical Science courses, as stated in the Program Expansion and Quality Enhancement section. This individual would also be responsible for managing and teaching in the proposed second-year Medical Science course (Principles of Human Disease). Also, this person would have an administrative role in e-learning and be a resource to all departments in Schulich (details are included in the Organizational structure below).

Increase in numbers of Graduate Teaching Assistants (GTAs):

The magnitude of the increased need for GTAs is unclear, as it will be tied to increased enrolment and will also depend on the mode of educational delivery. It is clear that the current budget for GTAs is well below that needed to support the current program, let alone support the anticipated increased enrolment. For example, as many as eight new TA positions will need to be allocated to the Medical Sciences 4900F/G course alone when the enrolment in this course expands from 120 to 180 students. This GTA deficit was also recognized in the SUUPR report and, although the program was found to be of “Good Quality”, it was one of the criteria requiring a follow-up report in two years rather than the traditional seven years. With the agreement of the Dean of Schulich, a new model of GTA funding has been proposed in which additional resources will be available to meet the anticipated costs for GTA positions in 2011/12, and going forward based on projected enrolment. To help with the planning, the BMSUE office solicited calculations from all Basic Medical Science Departments to match projected course enrolment with the number of GTAs required over the next 4-year budget cycle (see Table 4 below). The overall increase is greater than 50% from the 2009/10 baseline numbers.

Table 4: Projected TA appointments for the current domestic program only

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Department</td>
<td>FTE</td>
<td>FTE</td>
<td>FTE</td>
<td>FTE</td>
<td>FTE</td>
<td>FTE</td>
</tr>
<tr>
<td>Anatomy &amp; Cell Biology</td>
<td>17.923</td>
<td>19.475</td>
<td>23.750</td>
<td>27.750</td>
<td>27.750</td>
<td>27.750</td>
</tr>
<tr>
<td>Medical Biophysics</td>
<td>3.000</td>
<td>3.000</td>
<td>4.750</td>
<td>4.750</td>
<td>4.750</td>
<td>5.250</td>
</tr>
<tr>
<td>Pathology</td>
<td>0.250</td>
<td>0.250</td>
<td>0.750</td>
<td>1.500</td>
<td>1.500</td>
<td>1.500</td>
</tr>
<tr>
<td>Physiology</td>
<td>21.188</td>
<td>21.500</td>
<td>25.000</td>
<td>32.000</td>
<td>32.750</td>
<td>32.750</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>6.750</td>
<td>5.250</td>
<td>7.500</td>
<td>9.000</td>
<td>11.000</td>
<td>11.500</td>
</tr>
<tr>
<td>Epidemiology &amp; Biostatistics</td>
<td>3.250</td>
<td>3.250</td>
<td>3.250</td>
<td>4.000</td>
<td>4.000</td>
<td>4.250</td>
</tr>
<tr>
<td><strong>Microbiology &amp; Immunology</strong></td>
<td><strong>10.375</strong></td>
<td><strong>9.375</strong></td>
<td><strong>10.375</strong></td>
<td><strong>10.375</strong></td>
<td><strong>10.375</strong></td>
<td><strong>10.375</strong></td>
</tr>
<tr>
<td>Medical Sciences</td>
<td>4.300</td>
<td>5.110</td>
<td>4.750</td>
<td>6.750</td>
<td>9.750</td>
<td>9.750</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>73.906</strong></td>
<td><strong>74.330</strong></td>
<td><strong>87.425</strong></td>
<td><strong>104.925</strong></td>
<td><strong>111.425</strong></td>
<td><strong>112.675</strong></td>
</tr>
</tbody>
</table>
GTA positions for graduate courses, which are anticipated to increase, and for professional programs are also coupled to the need for an increase in GTA numbers. There is a desire to expand GTA responsibilities to assist in the recruitment of graduate students so the GTA/Graduate Student ratio at Schulich more closely matches that seen in other faculties (see Table 5 below). In related disciplines, we are second lowest to Health Sciences, which has more professional programs that do not qualify for Departmental Teaching Assistant (DTA)/GTA funding.

Table 5: TA funds allocated per full time graduate student in different Faculties

<table>
<thead>
<tr>
<th>Faculties</th>
<th>Grad Students (GS)</th>
<th>DTA/GTA ($)</th>
<th>DTA&amp;GTA Per GS ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts &amp; Humanities</td>
<td>344</td>
<td>2,957,510</td>
<td>8,597.41</td>
</tr>
<tr>
<td>Engineering</td>
<td>520.5</td>
<td>2,212,817</td>
<td>4,251.33</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>654.5</td>
<td>1,016,068</td>
<td>1,552.43</td>
</tr>
<tr>
<td>Inter-disciplinary</td>
<td>171.5</td>
<td>702,658</td>
<td>4,097.13</td>
</tr>
<tr>
<td>FIMS</td>
<td>356</td>
<td>415,973</td>
<td>1,168.46</td>
</tr>
<tr>
<td>Music</td>
<td>107</td>
<td>490,128</td>
<td>4,580.64</td>
</tr>
<tr>
<td>SSMD</td>
<td>501.5</td>
<td>942,569</td>
<td>1,879.50</td>
</tr>
<tr>
<td>Science</td>
<td>621.5</td>
<td>4,859,407</td>
<td>7,818.84</td>
</tr>
<tr>
<td>Social Science</td>
<td>512</td>
<td>3,409,274</td>
<td>6,658.74</td>
</tr>
</tbody>
</table>

2008-9 numbers

Increase in Faculty with expertise in teaching:

The need for additional faculty will depend upon the number of new course offerings suggested by the departments and the BMSUE Program Committee, as well as the mode of delivery of the curriculum. Regardless of the number, it is recommended that, in courses for which hiring on teaching skills alone is the primary criterion, limited term (5 year renewable) contracts with excellence in teaching be considered to accommodate this increased demand. The need for increased GTAs should be established by the recent poll of course coordinators of existing courses conducted by the BMSc program as well as those which may be required for additional online courses.
E. Organizational Restructuring:

Figure 2: Proposed Organizational Structure

Vice Dean Science (Academic)

- Provide leadership and advice to the Deans of Schulich and Science, as well as the faculty members of the undergraduate Basic Medical Science and Science programs.
- Provide leadership in strategic planning for the development of the Basic Medical Sciences for both domestic and internationalization.
- Serve as a spokesperson for the Basic Medical Sciences, and the Basic Science Chairs when requested, within Schulich, Western and externally.
- Liaise with Western Senior Administration with regard to policies, procedures and budget relevant to the undergraduate basic medical sciences program.
- Oversee the development of budget, allocations and accountability for the Basic Medical Sciences program including funding for Teaching Assistant support.
- Oversee the function of the BMSc degree program.
- Liaise with the Associate Deans in Schulich and Science such as Outreach & Diversity; Equity and Professionalism, Global Health & Internationalization, Continuing Professional Development and Graduate & Postdoctoral Studies.
- Represent Schulich on University Committees regarding Undergraduate Education programs, Globalization and Internationalization.
- Oversee undergraduate program review for the Basic Medical Sciences.

We need to simplify this. Also Basic Science Departments ARE THE BMSc PROGRAM. THIS STRUCTURE IS THAT OF A MINI MEDICAL CURRICULUM. All we need is a steering committee, a couple of support personnel already in place, an Associate Dean that consults with BMSc chairs and dedicated Undergrad Chairs. If anything, we should identify support and incentives for Undergrad Chairs in each of the BMSc founding departments.
**Associate Dean, Basic Medical Sciences Undergraduate Education**

- Report and provide advice to the Vice Dean Science (Academic)
- Provide input on the development of budgets, policies and implementation of the basic medical science program
- Oversee function of the BMSUE staff including the Program Manager, Administrative Assistant, Laboratory Coordinator and Educator/E-Learning Coordinator
- Oversee the development and production of promotional and recruitment materials, web-site, outreach programs etc.
- Administer the Medical Science Modules
- Chair the BMSUE Program Committee
- Act as a designate for the Vice-Dean when requested on Schulich, Science and Western committees
- Handle petitions, appeals, student code of conduct, Faculty code of conduct, and other academic issues related to the undergraduate basic medical sciences students and courses.

**Education Committee**

- Comprised of “educators” from the various departments (individuals whose primary focus is on teaching – e.g. Tom Stavraky, Kelly Summers, Derek McLachlin, Anita Woods, and Tim Wilson), the Educator/E-Learning Coordinator, and the Lab Coordinator.
- The members of the Education Committee should be involved in the Centre for Education Research and Innovation (CERI)
- The Educator/E-learning Coordinator will Chair the Education Committee and also represent it on the Program Committee (ex officio)
- Responsibilities include:
  - establishing education goals
  - reviewing curriculum within and across departments
  - assessing and recommending deployment of resources
  - reviewing and recommending modes of evaluation of student performance
  - development of online teaching

**Educator/E-Learning Coordinator**

- instructor for Medical Sciences 4930F/G (one section in each term)
- develops and instructs in new Medical Science second year course
- in concert with the Laboratory Coordinator, is responsible for training sessions for GTA’s (as per the recommendation in enhancing the BMSc experience)
- provides support for online course development and maintenance
- interacts with Teaching Support Center
- Chair of Education Committee (ex officio)
- Be an active member of CERI
Administrative Assistant/Officer – role/responsibilities

- responsible for hiring GTA’s
- administers BMSUE budget
- coordinates timetabling efforts
- provides administrative support for decanal level and educator
- responsible for maintenance of BMSc Website
- provides administrative support for adjudication, etc.

Program Manager – role/responsibilities

- adjudicates students for admission/progression into the BMSc Program
- provides information to students about the BMSc Program, including Intent to Register, activities, etc.
- oversees content on BMSc website
- interfaces with Academic Manager and Educational Policy Committees
- provides administrative support for changing/introducing courses and modules and drafting/editing DAP and SCAPA proposals for SSMD
- edits the academic calendar
- coordinate SSMD outreach activities

Lab Coordinator – role/responsibilities

- instructs Medical Sciences 4900F/G (currently two or three sections of 30 students in both first and second term)
- during the downtime of May-August: assist with developing the training of GTA’s
- assists in improvements and enhancements for the medical science courses
- theory needed for the lab be given by lab coordinator in a scheduled pre-lab lecture (currently one hour pre-lab and three-hour lab)

F. List of Appendices:

1. External Review of BMSc/BSc Management Structure
2. Recommendations From SUUPR Review
3. Notes from the BMSc Workshop, September 30, 2010
4. University Undergraduate Degree Level Expectations (UUDLEs)
Appendix 1: External Review of the BSc/BMSc Organizational Structure

October 27, 2010

Report on the Review of the Joint BMSc Program
of the Faculty of Science and Schulich School of Medicine and Dentistry
October 4, 2010

Submitted by
Dr. Margaret F. Cheesman, University of Western Ontario
Dr. Ian Cavers, University of British Columbia
Dr. J. Hugh Horton, Queen’s University

The review committee held a single day of meetings with stakeholders in the offices of the Dean of Science, UWO on October 4, 2010 for the purposes of reviewing the administration of the joint BMSc program. The committee was charged with evaluating:

1. The relationship of the BMSc program to the two Faculties involved and the popularity of the BMSc program on the registration to both Faculties;
2. The improvements in the counseling structure and operation with particular regard to the first year entry students;
3. Administrative structure managing the BMSc program;
4. The advantages/disadvantages of the combined recruitment efforts for the BSc and BMSc programs;
5. The general curricular model of a two years Science followed by two year Medical Science model;
6. The appropriateness of the Western policy allowing students to switch between programs after first year;
7. The potential for additional combined BMSc programs, similar to the BMSc/HBA program.

Meetings were conducted with the Deans, Associate Deans and Undergraduate Chairs from both the Faculty of Science and the Schulich Faculty of Medicine and Dentistry (Schulich); students in both the BSc and BMSc programs; staff members responsible for advising and student services from both Faculties; and representatives from the Registrar’s Office and Institutional Planning Office.

While the committee was not specifically tasked with reviewing the curriculum and learning outcomes of the program, it was apparent to the committee that the pride in the BMSc program readily exhibited by faculty, administrators and students alike is well placed. The following sections provide the observations and recommendations of the committee in response to the terms of reference and meetings with stakeholder groups. Four areas of particular note in the terms of reference are covered: the operations of the counseling and academic support structures; challenges surrounding expansion of the BMSc program; admissions processes; and the impacts on the BSc program in the Faculty of Science.
1. Counselling and Academic Support Structures

The sessions with senior undergraduate students indicated that there is a high degree of satisfaction with the counseling and academic support structures within both the Faculty of Science and Schulich. The relationship between the Science Student Council and the Counselling group, headed by Peggy Westmacott, appeared to be strong. Students also seemed to be familiar with, and able to readily access, the BMSUE services provided at the Schulich site. Students also indicated that the counselors are careful never to “tell” the students what to do, and that they are excellent at providing a source of guidance for academic decisions.

The sessions with Peggy Westmacott and the BMSUE group (Kathy Boom, Joan Estabrooks) indicated that, following the initial transition period, the roles of the counseling group located within the Faculty of Science and the academic support group at Schulich seem to have been largely clarified. However, there seems to be some remaining concern and stress associated with the elimination of the dedicated BMSc counselor. Kathy and Joan reported that the separation of counseling from module adjudication and grad checks is challenging at times. Joan reported some continuing confusion with students regarding her role and pressure to act as the Medical Science module counselor. However, it was recognized that “generalist” counselors familiar with all of the Science and Basic Medical Science programs are more efficient and provide better service to students overall. Given the strong collaborative relationship between these two staff groups, we anticipate these remaining issues will be resolved shortly. Relationships with other academic and health counseling groups on campus appear to be effective and appropriate.

The sessions with the Associate Deans indicated that both are effective in their roles, and the administrative structure, with an Associate Dean from the Faculty of Science, together with an Associate Dean seconded from Schulich and housed in the Faculty of Science offices, appears to be working well.

All three staff members indicated a number of concerns with student morale. In particular, Peggy noted that each year from January to July, the counselors are confronted with a large number of students who are becoming aware that they may not gain access to the BMSc program. This year, there appears to be greater agitation, and earlier in the academic year, amongst the first year students than normal, which is attributed to the uncertainty surrounding the very high intake numbers and the move to the split first year full courses into two half courses. This uncertainty and disappointment was not reflected in the student group to which we spoke, but it should be noted that this group may not have been a typical cross section: it included no first year students, and virtually all of the students had managed to access their preferred program. Of course, the issues around student morale cannot be resolved with counseling alone.
Changes to recruiting, admission, and communication practices may be necessary to manage student expectations and address this significant problem.

During the student discussions, the committee was struck by the apparent disconnect between the research-oriented nature of the BMSc program and the long-term goals of most students to attend professional schools. This disconnect has the potential to harm the program.

2. Expansion

There are clearly many benefits from the introduction of the BMSc program as a collaborative effort of Science and Schulich. For example, Dean Wardlaw stated that the introduction of the BMSc program has enhanced Western’s reputation as a leader in undergraduate education, increased the general quality of Science students, increased the size of the Science cohort, positively impacted budgets, and facilitated collaboration between Science and Schulich faculty beyond the joint undergraduate program. However, expansion in response to student demand of the BMSc program cannot continue indefinitely without diminishing the incremental benefits to Science, Schulich and the University and without potentially harming the viability of some Science departments due to an imbalance of students and resources. The Faculties are urged to engage in long-term enrollment planning, including setting enrollment targets for the BSc and BMSc alike, and developing flexible recruiting and admission strategies aligned with those goals. However, it seems inevitable that the result of such planning will call for the expansion of the BMSc program to some degree. A number of barriers to the expansion of the medical sciences program were identified during the committee’s site visit as outlined below.

Fourth-Year Research Projects
Lack of sufficient fourth-year research project opportunities was identified as a barrier to further enrolment expansion, particularly in the smaller-enrolment Honors Specialization modules. The committee was surprised to learn that Schulich faculty did not participate equally in the supervision of these projects. Incentives for faculty to take on more fourth-year project students should be encouraged. Alternatively, the committee suggests considering the possibility of including the supervision of undergraduate research students in the yearly work plan of each faculty member. The introduction of new cross-Faculty modules, such as the proposed Chemistry and Biochemistry module, would also permit Science faculty to share in the supervision of undergraduate research opportunities.

One module that was identified as under-enrolled was the Medical Biophysics module (by as many as 12 positions). This appears to be due to the fact the students require second-year physics courses as prerequisites, which students find difficult to add to an already crowded academic program.
Graduate Teaching Assistants
According to data received by the review committee, graduate enrollment in the two Faculties is relatively large (542 graduate students in Schulich and 696 students in Science; 2009-10 SGPS data). In both Faculties, most of the financial support comes from Departmental Teaching Assistantships. However, the fraction of Schulich graduate students doing TA work is relatively low. This appears to be an impediment to expansion of the program. Meetings with Dean Strong and Undergraduate Chairs in Basic Medical Science departments indicated there are several reasons for this, including: (1) a culture of postdoc-oriented research; (2) the expectation that investigators will pay the whole stipend of a graduate student, with teaching considered an “extra” to their salary. Undergraduate Chairs indicated that most researchers would view graduate student teaching as having value, but there would be mixed reactions to releasing students from research time to do TA work, even if it resulted in a reduction in the research stipend paid by investigators. The view of the graduate students themselves was not explored. Dean Strong indicated that he felt the resources for additional TAs must come from at least two sources. Dean Strong called for more transparency in central TA funding and additional allocations to Schulich. In addition, he indicated there was money in departmental budgets available now to pay for TA positions, but that current practice was to fold in any transfers to departments’ main budget. Therefore, any increase in TA numbers may require Department Chairs to reallocate some of their budgets. Ultimately, even with the identification of additional funds, expansion of TA positions will be limited by the size of the graduate program.

Space
Space was identified as a very significant brake on expansion of enrolment in the BMSc program. Dean Strong is pursuing opportunities to build a new medical science building(s). There are several space problems that have direct relevance to the BMSc program. One is space for researchers, who host fourth year research project students. Of more direct importance, several undergraduate labs were identified by Undergraduate Chairs to be substandard, particularly the ventilation, and overcrowded with several different classes (physiology, anatomy, pharmacology) cycling through each week. Finally, the question of classroom space was raised. There is a lack of small classroom space in the current Medical Sciences building. This problem may have a more immediate solution, as similar space elsewhere on campus is available, near the Medical Sciences complex.

Cross-Faculty Modules
The potential to use capacity within the physical and mathematical sciences by creating cross-faculty modules between Schulich and Science appears to be viable. One module “Biochemistry and Chemistry” is in the approvals process. Undergraduate Chairs in Science noted two significant barriers to the creation of such modules. First, that to be denoted as “BMSc” the module must contain at least half medical science courses. This appears to be due to revenue attribution
reasons rather than pedagogical. Secondly, the Undergraduate Chair in Computing noted that some Science modules that may be of interest to medical science students, such as the bioinformatics module, are under enrolled due to the difficulty in fitting prerequisite courses into what is already a crowded BMSc course load. Presumably other innovative combinations might also have similar problems.

To facilitate the creation of additional cross-faculty modules the committee recommends revisiting the BMSc module framework, and perhaps budget models, to permit more significant involvement by Science departments in third and fourth years. In addition, the committee recommends capitalizing further on the opportunities provided by splitting first year courses to expand the elective space in the first and second years. This would likely require restricting the maximum number of first and second year courses any module may require. This added elective space would enhance the ability of students to explore non-traditional courses and pathways or permit the introduction of survey courses in science or medical science. Added elective flexibility could also benefit students who ultimately are not admitted to the BMSc by helping them identify or develop a passion for other areas of Science earlier in their program.

3. Admissions

Recruitment and Representation
A common theme voiced by virtually all groups we met with was a concern regarding the representation of the Basic Medical Sciences Program. Both Science and Medical Science Undergraduate Chair groups, the counseling and BMSUE groups and, to a lesser extent, the Deans and Associate Deans, expressed concerns about the misconception the “M” in BMSc raises in some students’ minds that this program is a “fast-track” to medical school. Prospective students are currently asked to choose one of two options when applying to science at Western through the Ontario Universities Application Centre (OUAC): the “ES” option indicates the BSc, while the “ESM” option indicates an interest in the BMSc program. Admission through the ESM channel does not in fact guarantee admission to the BMSc program: this is ultimately determined by the student’s academic performance in first year, and to a lesser extent second year. Both sets of students are enrolled in the same science courses in first year, and indeed both are potentially admissible to any BSc or BMSc module after first year. This “two-button” admissions concept appears to be well understood by both Undergraduate Chair groups (but not the students!). The fact that not all students who choose ESM on the OUAC site are guaranteed a space in the BMSc program, and that in fact the opportunities available to both sets of students are exactly the same, was seen to be quite problematic by some groups. While it is clear that the BMSc program, and the option to choose the ESM button on the OUAC website has brought many benefits to science at Western, increasing both the quality and number of students in science generally, it has come with a cost. As noted above, the counselor’s group sees
many students in the winter of their first year who are beginning to confront the reality that their grades are too low to gain entry to the BMSc program. Messaging that is sent to disappointed students includes: “What can I do to get back on track?”; a consideration of long-term goals; and recommendations to consider modules in Biology. Nonetheless, there does appear to be a group of students in second year who “shadow” the BMSc program, hoping to improve their marks and be accepted in third year. The exact numbers of such students was not clear, and only one such student was included in our session with undergraduates.

On the other hand, there is familiarity with much of the admissions material amongst the undergraduate students we met. In particular, they noted the “BSc/BMSc/BHSc: What’s the Difference?” page included in the Science at Western and Faculty of Health Sciences Guidebook recruiting documents. It was also quite telling that when asked the question: “Why did you come to Western?” none of the students we met indicated the BMSc program in particular. Answers included that the university and science programs in general were perceived to be of high quality; the university was close to home; the campus atmosphere was attractive; and that it had been recommended by either an alumnus family member or friend.

There was also a general perception amongst science Undergraduate Chairs that the BMSc program had removed students from the standard science programs. While some programs, notably computing, have had their enrolment decrease in the last 10 years, the Western Databook statistics indicated that most science departments have in fact seen an increase in student enrolments during that time. Part of this misconception probably arises from the fact that while enrolments have increased, they have not risen as rapidly as those in the BMSc programs.

**Common vs. Separate Admission with B.Sc. Program**

Several options were suggested by stakeholder groups:

1. **The “single button”**

   This model would have a common admissions channel to both the BSc and BMSc programs, with the understanding that students would compete for access to all programs (science or medical science) following their first year. Advantages to this system include the fact that it is relatively transparent, and would likely maintain a high entrance average to the science programs in general, as long as the admission cutoff is not tied to other programs across the campus. One disadvantage might be less opportunity to strongly market the BMSc program, although student perceptions noted above may mean that this is less a problem than might otherwise be expected. A more serious disadvantage is that by combining the two streams an important tool for managing the profile of incoming students is lost. Students desiring the BMSc
may further dominate the admitted cohort while students with lower marks hoping to access standard science stream subjects might be shut out of Western. This would be to the detriment of enrolment in Science departments with less demand and increase the number of disappointed students.

2. “Hard two button”

Such a model would have completely separate admissions channels to the BSc and BMSc programs, with the BMSc admission target set such that there would be space in the program for all students who are admitted in this stream. This appeared to pose an insurmountable difficulty: namely, that current trends would lead to a very high admissions average to the BMSc, and a significant reduction to the BSc admission average, possibly below the minimum target at the university. Thus, some potential students would not be recruited. In addition, selection for the BMSc would be based on high school marks, which may not be the best predictor of academic performance at Western. On the other hand, this is the most transparent approach to admissions.

3. “Soft two button”

This is a modification to the current model. The main difference is that students would be told up front what average they would need in first year in order to be guaranteed access to the BMSc program. Students not achieving this average would be placed on a waiting list and would compete with students who arrive through the regular BSc channel for any remaining spaces. This compromise is favoured by Dean Wardlaw. It is relatively transparent, and reasonably simple to message. A disadvantage to this model is that were the BMSc channel to over enroll, either during the admissions process, or due to higher than expected performance amongst first year students, there would be no option but to accommodate the excess students within an expensive BMSc program. Such difficulties might be avoided by identifying the second year admission average through a careful modeling process that by design leaves a modest proportion of the BMSc seats unfilled by streamed students. These seats could act both as a buffer to absorb year to year fluctuations in student performance and to provide a possible admission avenue for high achieving students in the BSc or other programs.

4. “Three buttons”

This option would have three entry points: BMSc, Biology, and the physical/mathematical sciences. It would acknowledge the fact that most students who fail to meet the standards of the BMSc program choose biological sciences as their second choice. This approach is only viable if each of the three options is free to set their admission standards
independently of other programs. It is less clear how this model would affect enrolment patterns in the BSc and BMSc programs. Again, minimum admission standards might be lowered considerably in the less popular physical/mathematical science stream. In addition, the interests and abilities of students in high school do not always transfer well to university. As a result, not all BMSc students will end up being able or wanting to continue in the BMSc. This could result in considerable flow between Biology (and other programs) and the BMSc, lessening the advantages of this streamed approach over others.

While the committee favours the “Soft Two Button” approach, no matter which admission approach is ultimately chosen, attention needs to be paid to the manner in which admission and continuation requirements are implemented. The current practice of re-qualifying for the BMSc each year is a significant stress on all students. While setting high standards can be an important student motivator, the uncertainty associated with current practices potentially drives inappropriate behavior (in their choice of courses or in their willingness to explore unfamiliar degree options) as students fixate on achieving the highest possible grades. The program and its students may benefit from more certainty. Extending the ideas suggested in the “Soft Two Button” approach above, reasonable levels of achievement should be set and published for continuation in all BMSc modules. If a student meets the appropriate threshold continuation in the BMSc would be guaranteed. Once again these thresholds (year two to three being the key transition) could be modeled to accommodate for potential bulges and to leave some space for other excellent students. This more transparent approach might also send a stronger message to unsuccessful students planning to shadow BMSc modules and encourage them to consider other options earlier in their university program.

As discussed previously, several groups raised concerns regarding the imbalance of student interest for the BMSc, Biology and other Science programs. Targeted program recruiting, differential admission thresholds, and the setting of realistic student expectations can help to balance the student intake. Enhancement of the perceived attractiveness of BSc programs must be a key component of the ongoing enrollment management strategy. Following the lessons learned through the success of the BMSc, several people suggested that niche programs need to be identified or developed that can act as similar attractors to the BSc. As part of these efforts tracking of the subject areas pursued by students who are not accepted to the BMSc is recommended.

4. Curriculum/Impact on B.Sc. Program

_Inflexible module structure_
As noted above, one impediment to more sharing between the two faculties is the fairly rigid and tightly packed structure of many of the BMSc modules. Both students and Undergraduate chairs in the basic medical science departments
noted the need for an introductory course in basic medical sciences. Students in particular found that it was hard to make choices regarding which module(s) to select in third year, given that they had little knowledge or understanding of many of the basic medical science disciplines. In addition, the introductory course in basic medical sciences could serve to differentiate BMSc students if taught in second year. Thus, a common course introducing the disciplines should be considered. The challenge will be to fit this into an already busy BMSc program while at the same time increasing flexibility to accommodate a wider range of collaboration between disciplines. As described above, the committee recommends restricting module requirements in first and second year to increase elective space.

*Links to Other Faculties*
While the potential to create modules shared between Schulich and Science was indicated above, it should be noted that there are sharing options including other faculties. Dean Strong indicated potential for shared modules with the Faculty of Engineering. The Department of Geology presented some data which shows that for this department, their largest student cohort in first year comes not from Science, but from the Faculty of Social Science. Therefore, this department should consider exploring the creation of a shared module with the Geography Department in that Faculty, or with the Environmental Studies programs. This may provide an opportunity of creating a niche/attractor program in the area of sustainability. There may also be potential links between Science departments and the Psychology Department.

*Flexibility on Revenue Sharing*
This was identified as a barrier to offering shared modules. In the case where the module content varies from the “2+2” revenue sharing agreement between the Faculties, an alternative revenue sharing agreement might be considered.
Appendix 2: Senate Summaries From SUUPR Review

Senate Agenda
October 15, 2010

EXHIBIT III, Appendix 3

Annual Report of the Subcommittee on Undergraduate Program Review (SUUPR)

SUUPRs role is to coordinate and assume responsibility for undergraduate program reviews of new undergraduate programs to be recommended to the Senate Committee on Academic Policy and Awards (SCAPA) and Senate, and existing undergraduate programs to be reviewed on behalf of SCAPA. Dr. Michael Milde took over the Chair’s post from January 1 to June 30, 2010, while Dr. Brian Timney was on leave. During the 2009-2010 academic year SUUPR met 6 times: November 20, January 20, February 24, April 14, May 19 and June 21.

SUUPR’s activities during 2009 – 2010 included the following:

. . .

5) Review of modules and programs:

. . .

The programs reviewed during 2009 – 2010 are:
• Anatomy and Cell Biology, Bachelor of Medical Sciences, Biochemistry, Biology, Dentistry (DDS), Medical Biophysics, Microbiology and Immunology, Pathology, Physiology and Pharmacology

. . .

2009 – 2010 REVIEWS

D) Department of Anatomy and Cell Biology – Schulich School of Medicine & Dentistry

The following Executive Summary was prepared by Dr. Darren Meister, Faculty Director, HBA Program, Richard Ivey School of Business; External reviewer: Dr. Richard Oko, Professor and Graduate Coordinator, Department of Anatomy and Cell Biology, Queen’s University

Dr. Oko’s report and the Department’s responses illustrate a well-functioning undergraduate program that has several laudable elements. Innovation both in teaching large classes and in developing pedagogy for engaging senior students in more active learning was obvious. It was noteworthy to see the broad enthusiasm of the faculty for the innovation (and recognition of both the effort and value in the hard work inherent in getting it right) and the degree to which the students appreciated the learning experience.

The concerns of the program are common across the University. There are critical people – both faculty and staff – for whom there is little if any backup. This Department is not unique but is illustrative of challenges found throughout the University. However, as it is a small department with a relatively small staff complement, challenges are more acute. I would hope that this would encourage further discussion at the Faculty and University levels of how to ensure that staffing issues at the departmental level do not adversely and noticeably affect the quality of the undergraduate experience.

Another point that is worth discussing across the University community is the link between teaching quality and physical plant. At this time, the Department’s ability to offer some of its classes is limited by classroom availability. It is always difficult to anticipate room configuration needs as a university evolves, but this Department’s experience encourages us to remember the need to develop flexible infrastructure that facilitates different teaching pedagogy that may evolve over time.

Finally, I would like to comment on the decision of SUUPR to use a non-scientist as the internal reviewer. As the Director of the HBA program, I was pleasantly surprised to find the degree to which issues in undergraduate education are similar between my unit and this Department. I feel privileged to have had the opportunity to meet colleagues in this Department and to better understand the work they do. I strongly encourage SUUPR to continue to use its own members as internal reviewers when possible.

SUUPR Recommendation: Good quality
E) Bachelor of Medical Sciences – Schulich School of Medicine & Dentistry

The following Executive Summary was prepared by Dr. Jeff Wood, Faculty of Engineering; External reviewer: Dr. Delsworth Harnish, Professor in the Departments of Pathology and Molecular Medicine and Biology, and Assistant Dean, Bachelor of Health Sciences Program at McMaster University

The Bachelor of Medical Sciences Program was reviewed on April 20, 2010 by Dr. Delsworth Harnish, 3M Fellow, Professor in the Departments of Pathology and Molecular Medicine and Biology, and Assistant Dean, Bachelor of Health Sciences Program at McMaster University. As the SUUPR representative, I served as the internal reviewer for the program. This document summarizes the report of Dr. Harnish and the response by Dr. Doug Jones, Associate Dean, Basic Medical Sciences Academic Affairs, Schulich School of Medicine & Dentistry.

During the day’s interviews, it was very clear that the faculty and staff associated with the BMSc program are fully committed to its success. This was echoed by the group of eight undergraduate students who spoke highly of their collective experiences in the program and had particularly high praise for the BMSUE counseling and support staff.

Dr. Harnish, in his report, describes our meetings with each of the groups on the day’s agenda and finishes with a list of twelve recommendations which include some criticism but, in general, provide useful comments and suggestions for the improvement of the program delivery. The response from Dr. Jones addresses each recommendation in detail. In this summary, I group the twelve recommendations into three categories: Admissions, Program Delivery, and Student Engagement. In all but one instance (described below and attributed to a misunderstanding), the External Reviewer and the Associate Dean were in agreement with respect to the Reviewer’s comments and suggestions.

Admissions
The BMSc program is in very high demand. Both Dr. Harnish and Dr. Jones acknowledge that the current admissions model is somewhat problematic in that the potential exists for a significant fraction of first-year students to be denied entry into their program of choice. This is a function of Western’s “common first year” approach. Dr. Jones indicates that a variety of alternative admissions models are under consideration by the BMSc program in consultation with the IPB and the Registrar’s Office.

Program Delivery
The most significant of the operational issues of the BMSc program noted in the review are concerned with the TA Support budget. The budget was established in 2006 (including a one-time supplement to account for the double cohort year). Increasing program enrolment has meant that the per capita TA budget has decreased steadily and is expected to be in a deficit position in 2011. The lack of TA support for the BMSc program in comparison to other programs in the SSMD “will send the wrong message to students with respect to the value of their courses and the program.”

Dr. Harnish makes a number of recommendations regarding the pedagogy of the BMSc program and areas in which the program delivery may be enhanced. In some cases, these criticisms address issues that extend beyond the Medical Sciences modules. In his response, Dr. Jones indicates that many of these recommendations regarding program delivery addressed issues that either are or will be addressed by the BMSUE committee including:

- Overlap between courses. This extends beyond the Medical Sciences modules and is constrained by the multiple student pathways through the various modules.
- The importance of introducing group work and active learning throughout the curriculum.
- Evaluation methods. Increasing the level of formative evaluation – particularly in earlier years – is strongly encouraged by Dr. Harnish. The use of multiple choice examinations in the program appears to be significant with students reporting that “I didn’t have a written exam until 4th-year.”
- The introduction of formal course credit for attending research seminars. This suggestion was made as an approach for attracting more undergraduate students to consider a research career in the field.

The involvement of the Teaching Support Centre is recommended to the BMSUE committee as an important resource as it works toward addressing these recommendations.
Student Engagement
While the student group was exceptionally enthusiastic about their experience in the program, Dr. Harnish offers two recommendations to further improve the engagement of BMSc students and their sense of community within the program:

- Consider a “community communication strategy” for students (such as a subset of the Western ‘Facebook’ page). The space should persist for the students beyond the school year and perhaps beyond graduation as a means of maintaining contact and fostering mentorship opportunities beyond graduation.
- Conduct exit interviews to gauge student perceptions of the program in the spirit of continuous improvement.

In summary, the review has resulted in a very positive impression of the Medical Sciences module and the BMSc program. With the noted exception of the TA budget, the recommendations of the External Reviewer consist of constructive criticisms designed to further improve a successful and popular program of the Schulich School of Medicine & Dentistry.

SUUPR Recommendation: Good quality with report in two years
Issues to be addressed: Admission process, curriculum and integration of TAs

F) Department of Biochemistry – Schulich School of Medicine & Dentistry
The following Executive Summary was prepared by Dr. Mark Workentin, Faculty of Science; External reviewer: Dr. Michelle MacDonald, Associate Professor and Associate Chair, Undergraduate Affairs, Department of Biochemistry and Biomedical Sciences, McMaster University

The Department of Biochemistry was reviewed on March 11, 2010 by Dr. Michelle MacDonald who is an Associate Professor and the Associate Chair of Undergraduate Affairs for Biochemistry and Biomedical Sciences at McMaster University. Her position at McMaster is directed specifically at undergraduate education, and improving teaching and learning. Like Western, McMaster’s biochemistry and biomedical sciences programs are not in the Faculty of Science, but in their Faculty of Health Sciences (which incorporates medicine, nursing, and rehabilitation studies). Because of these similarities, her perspectives on the undergraduate modules in biochemistry are particularly germane. As the SUUPR representative, I also participated in all aspects of the review. Unfortunately, no student representative was available to serve on the review committee.

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, teaching faculty, and staff, specifically, those involved in the laboratory courses. An engaged group of current undergraduate students were consulted and in a separate meeting, so were about 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 modules and the student experience.

Dr. MacDonald provided an informative report that captured the main issues that arose during the visit and offered a number of useful and creative recommendations. However, the report was not received by the Department until late June. Because of this delay it was difficult for the Department to get its undergraduate education committee and other stakeholders together during the summer months to discuss and respond to the external report. The Department provided a thoughtful response of how it is working to address the recommendations. This was received on September 13, 2010.

Dr. MacDonald provided an informative report that captured the main issues that arose during the visit and offered a number of useful and creative recommendations. However, the report was not received by the Department until late June. Because of this delay it was difficult for the Department to get its
undergraduate education committee and other stakeholders together during the summer months to discuss and respond to the external report. The Department provided a thoughtful response of how it is working to address the recommendations. This was received on September 13, 2010.

The external reviewer also made a point of highlighting the important contributions that Dr. Derek McLachlin (a limited term education-focussed faculty member) has made to the program in terms of course and laboratory development and by providing a constant and recognizable face to student counselling. Dr. McLachlin (and the position) was applauded universally by faculty, staff and students during the site visit.

The only other major recommendations were directed at strengthening the apparent variations in enrolment (from high enrolments to lower enrolments), particularly in the fourth year of the program. Part of this variation was tied in this review and other reviews during the past year to poor communication from the Faculty in terms of grade requirements and enrolment caps within the modules in the BMSc. This is being addressed by the Faculty. Other avenues that were recommended to address this issue were to encourage more interdisciplinary modules with other departments where there are natural connections. The Department is open to these opportunities and will hopefully be introducing to SUUPR this fall a new module in Chemical Biology in collaboration with the department of Chemistry that they believe will be popular with students and help fill the added capacity in their fourth-year research courses.

In summary, the review found that the Department of Biochemistry offers excellent undergraduate modules that lead to BMSc degrees in Biochemistry that position graduates well to be able to enter the best MSc and PhD programs in Biochemistry, professional programs and other career opportunities. It is committed to continually assess and improve its 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 to implement change creatively in order to address all the recommendations.

SUUPR Recommendation: Good quality

I) Department of Medical Biophysics – Schulich School of Medicine & Dentistry
The following Executive Summary was prepared by Dr. John Hatch, Associate Dean, Faculty of Arts and Humanities; External reviewer: Dr. David Taylor, University of Ottawa

On April 16, 2010, Dr. David Taylor from the University of Ottawa and I undertook a well-coordinated and congenial site visit. The level of participation and engagement on the part of faculty, staff and students was noteworthy; the self-assessment itself was comprehensive and well-organized, ensuring a rather effortless navigation through the various issues raised in our discussions with the different groups consulted during our visit.

The day involved discussions with Allan Weedon, Vice-Provost (Academic Planning, Policy, and Faculty) and John Doerksen, Vice-Provost (Academic Programs and Students); Drs. Ian MacDonald and Abbas Samani, both members of the Undergraduate Program Committee who spearheaded the assembling of the Departmental self-assessment/report, with the former being the outgoing Undergraduate Chair and the latter the incoming Undergraduate Chair, and the Chair of the Department, Dr. Jerry Batista; faculty members; Dr. Doug Jones, Associate Dean (Basic Medical Sciences Academic Affairs); current students and two former students who are presently in the graduate program; ancillary support staff; and, teaching assistants. We were also given a tour of the facilities in the Medical Sciences Building and the Robarts Research Institute.

The external reviewer was quite impressed with the Department which, it should be noted, is rather unique in being only one of two Medical Biophysics programs in Canada, and the only one to offer an undergraduate degree. The small size of the Department, the quality of the teaching offered, and the state-of-the-art resources make it an enviable destination for undergraduate students interested in the field. The feedback garnered from the students themselves attests to this quality; all fiercely identified themselves with the Department and the field.
There were only three issues of note identified by the external reviewer that he felt needed to be addressed. The first is the lack of an identifiable core faculty, which is not surprising given the particular nature of the Department, its size, its funding structure, and the disciplines for which it is responsible. The fact that there are a number of faculty members near retirement who obviously need to be replaced to ensure the viability of the Department was another concern noted. Lastly, the need for more standardized course outlines and content, and a more diligent curriculum oversight, was also identified as a problem, one that should be addressed sooner than later. Happily, the Department is working already to better improve the latter, which should help some of the issues identified by the external reviewer that have arisen as a result of the lack of an identifiable core faculty. In the end, these are relatively minor concerns and don't diminish in any way the excellent education provided by the Department of Medical Biophysics.

**SUUPR Recommendation: Good quality**

**J) Department of Microbiology and Immunology – Schulich School of Medicine & Dentistry**

The following Executive Summary was prepared by Dr. Mark Workentin, Department of Chemistry, Faculty of Science; External reviewer: Professor Betty Worobec, Associate Dean, Faculty of Science, University of Manitoba

The review itself included information provided in a comprehensive and well-organized Self-Appraisal document as well as that gathered during the site visit. A small but very engaged group of current undergraduate students were consulted as were, in a separate meeting, 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 modules and the student experience.

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 modules, which include counselling services and library facilities, were found to be excellent. While the Department offers a number of modules and contributes to several in other BMSc programs, the Honors Specialization module (HSP) is its largest enrolment module. This module’s 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 equally important skills such as scientific writing and oral presentations.

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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 who 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) 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 module. It is committed to continually assess and improve its 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 of meeting many of the recommendations.

SUUPR Recommendation: Good quality

K) Department of Pathology – Schulich School of Medicine & Dentistry
The following Executive Summary was prepared by Professor Donna Peterson, Faculty of Health Sciences; External reviewer: Professor Paula Wilson, Associate Dean, Faculty of Science and Engineering, York University

The Department of Pathology offers two modules in the Basic Medical Sciences leading to a Bachelor of Medical Science Degree, with Honors Specialization or Specialization in Pathology and Toxicology. In addition, the Department has a commitment to teaching undergraduate students within the Faculties of Science, Medicine & Dentistry, and Health Sciences. Both clinical pathologists and basic scientists in the Department of Pathology participate in the coordination and teaching of undergraduate courses. Even though a number of the core faculty have won teaching awards, a concern raised by both the Reviewer and the Department was the lack of an appropriate evaluation tool for the many courses taught by multiple-course instructors. Both agree that UWO administration and a Senate Committee should look to finding a remedy.

While the Reviewer concluded the objectives of the Year 3 course are well set and provide an overview of Pathology, he suggested including a much greater focus on current research aspects and perhaps a stronger molecular focus. He also suggested that increasing the basic science component would attract students with a leaning toward research careers. Concern was also expressed for the lack of indepth Patho(bio)logy in Year 4. In its response, the Department stated that “reviewers fail to see and appreciate the synergies and complementarities of courses that occur across all of the medical science departments” when departments are reviewed in isolation. The Department is also working actively on ways to attract more students by providing them with better information about options the study of Pathology provides. It should be noted that the observations and suggestions of the Reviewer acknowledged that the Department has faculty, facility and funding limitations that drive some of their choices. In his summary comments he stated, “The Program has a core of dedicated faculty. What they do, they are doing well, and the students are well satisfied.”

Finally, the positive, supportive and friendly rapport among students, faculty and staff was both genuine and impressive. There is no question the Program Coordinator and her staff are doing an excellent job. They have sought cautious and creative solutions to provide course and research opportunities for students and respect the complicated workload obligations of Program faculty.

SUUPR Recommendation: Good quality
L) Department of Physiology and Pharmacology – Schulich School of Medicine & Dentistry

The following Executive Summary was prepared by Dr. Keith Griffiths, Associate Dean; External reviewer: Dr. P. Ken Rose, Associate Dean, Life Sciences, Queens University

The external review was carried out by Dr. P. Ken Rose, Associate Dean, Life Sciences, Queens University. The Department expressed satisfaction that Dr Rose was aware of all the relevant issues and was well qualified to make the review. For the most part, the review presents a very favourable picture of the programs and operations offered by this department. Dr Rose states:

“With few exceptions, the components that make up the undergraduate programs in the Department of Physiology and Pharmacology are excellent. The students who complete the honors specialization modules through this department receive a rigorous and comprehensive education in the key concepts, methodologies, current advances, theoretical approaches that lie at the core of contemporary physiology and pharmacology.”

The important exception to this favourable picture rests within certain courses in the Pharmacology program, specifically, Pharmacology 3550 and 3580Y, and the subsequent sharp decline in the interest in this program. Enrollment in HSP Pharmacology is stated to be at 10 for 09/10. These two particular Pharmacology courses are the subject of pointed criticism, and hence of specific recommendations which the department is very open to address. A further concern is noted to be availability and/or quality of academic advising, and a related lack of clarity in the “chain of authority” associated with programs and permissions, etc. As noted by Dr. Rose, transfer from the Faculty of Science to the Schulich School of Medicine & Dentistry seems to be at the core of this dissatisfaction.

Several clear recommendations are made and without exception, the Department is in agreement with these and/or is already working toward solutions or mitigation. Namely:

• Academic Advising. Access to informed academic guidance in a timely manner is an essential component of a successful undergraduate degree. (I note that this is not in the hands of the Department, but rather the Faculty of Science, which houses the academic advising for all science and BMSc students. FoS has implemented a number of changes over the past couple of years in response to an external reviewer’s report. The changes are slow to filter down, but a steady improvement in the function of this service is now evident.)
• The Department should be supported in its endeavors to revitalize the third-year component of the Pharmacology module in pharmacology.

In response, Prof. Hore, Acting Chair, notes: “This is an issue that the department is aware of and is working on. First, in September, 2011 we will withdraw the current third year Pharmacology courses. At this time we will introduce a new third year Pharmacology course that will be based on systems (renal, cardiovascular, central nervous system etc.) and therapeutics (drugs to treat medical conditions). This is expected to appeal to the third year class, many of whom hope to enter medicine. Second, we are in the process of reviewing the third year pharmacology laboratory. This lab will be improved either by revamping it with a more hypothesis-based approach, or by merging it with the highly rated Physiology 3130 lab.”

• Financial Resources. The impact of the budget cuts cannot be ignored.
• Capacity for Growth. The Department will face significant challenges due to the finite capacity of the 4980 courses.
• Revise the Rewards/Recognition for Teaching Excellence. (As noted in the letter from the Acting Chair, this is not a “local” issue and requires a University-level response.)
• The creation of trans-disciplinary themes within the framework of the fourth-year courses offered by the Department (perhaps in collaboration with other departments) has the potential to change an otherwise very good collection of individual courses into a superbly integrated program.
• A further major concern is what appears to be a looming shortage of faculty who are available to teach at the undergraduate level. Many faculty members have workload distributions which are
heavily skewed towards research. This issue is acknowledged by the Acting Chair, but no specific actions are provided at this time.

Of interest and significance, Dr. Rose also levels some criticism at the review process itself:

1. “The Review Process. Although the expectations described in the UUDLEs have become the standard by which all undergraduate programs are measured, very few faculty are aware of these benchmarks. This has potentially serious consequences in a review of this nature. For example, the self-study submitted by the Department was very comprehensive and exceptionally well organized. But it often failed to address the learning outcomes that lie at the core of the UUDLEs. In discussions with the senior members of the administration, it is apparent that the review process is also under review. This review is timely and provides an opportunity to clarify the format of the self-study and the importance of addressing the UUDLES.”

SUUPR Recommendation: Good quality with report in two years
Issues to be addressed: Third-year courses in Pharmacology
Appendix 3: Notes from the BMSc Workshop, September 30, 2010

Minutes from BMSc Workshop
September 30, 2010, H101, 1:00 - 4:30 p.m.

In attendance: Kathy Boon, Joan Estabrooks, Doug Jones, Michael Strong, David Wardlaw, Dwayne Martins, Keith Griffiths, Kem Rogers, David Litchfield, Rob Bartha, Bertha Garcia, Jon Hore, Abbas Samani, John McCormick, Tom Stavraky, Martin Sandig, Brian Shilton, Darren Meister (Ivey), Debbie Jones (ITS), Nanda Dimitrov (TSC)

Welcome and Opening Comments – Doug Jones

• Objective for the day is to START planning phase for the next decade
• Key Question: How do we Foster and Manage the Growth of this Premier Program?
• Introduced Agenda for the afternoon Workshop

Comments – Mike Strong

• Can anticipate 50,000 new Year 1 students across Ontario over the next decade
• This could be an increase at Western of 3000-4000 first year students
• BMSc is becoming a destination program – is current increase a blip or trend?
• How will Schulich deal with increased numbers? Where will we, physically, put these students? How will we teach them? Questions about new courses, more space, issues around staff and faculty, need to assess teaching methods, distributed teaching technologies
• Internationalization component – increasing Western’s footprint
• Masters of Public Health – university-wide, trans-faculty program
  o Has uniqueness to be a destination program
  o 2012 will be first year for Masters students
  o How big? Initially looking at 20 but potential for 80-100 students
  o Will be cornerstone of new building
  o Potential to fast-track Masters from programs such as BMSc

Comments – David Wardlaw

• Science can benefit from increased numbers and popularity of BMSc Program
• Brings high-end students to Western and increases quality of students in Science
• By default, the result is an increase in enrolment in Science
• Generally, enrolment in Science faculties across Canada is declining—increase in Year 1 this year is good for Western and Science
• What do we do about students who are admitted into Year 1 Biological and Medical Sciences (ESM on OUAC application) but are not accepted into the BMSc program?
• Need to create more joint basic medical science/science programs
• Cross-teaching of courses/programs from both faculties i.e. proposed Honors Specialization in Chemical Biology (BMSc)
• Flagship programs are attractive to international students – good recruitment tool
• An increase in undergraduate enrolment should result in increased numbers of qualified students for graduate studies.
• Need to give meaning to admission options (ES and ESM) – discussions ongoing
• All first-year Science courses are now offered as half courses and the faculty is contemplating revising the first-year requirements so that students will be exposed to more areas in Science – considering a modest Science breadth requirement: one half course from 5 of the 8 Science departments is taken in Year 1

Comments – Debbie Jones (Director, ITS)
• Western using virtual servers so systems will never be down
• WebCT/Wimba - costs are increasing so looking for other programs
• Blackboard owns everything so few options
• Will take 1.5 years to implement change and train users
• Email for Life will be available for graduates in February 2011
• Western developing Apps (directory search, maps, news, calendars) for iPhones and other PDA
• In the process of linking digital signage on campus – multi-screened, ticker tape messaging
• Federated Identity – Western is part of EduRoam, which allows students, using Western ID and password, to log-on to other university servers giving them free network access

Teaching Smarter – Tom Stavraky
• Department of Physiology and Pharmacology uses online teaching in several courses
• Able to accommodate large numbers
• Jay Loftus would be contact at Schulich to help in the development of online courses
• Movement toward online learning outside of class – lecture used for problem-solving and discussion

“NOW” Snap-shot and Challenges – Doug Jones
• The UG enrolment is approximately 60% of ALL trainees at SSMD
• It IS a successful program with high performing graduates
  o Highest recommendation of any UG program at Western (2010 survey)
  o 50% of our graduates go to professional programs
  o another 30% go to graduate programs
• This is recognized as a “Destination Program” at Western
• Students want EARLIER exposure to BMSc courses; years 2 AND 1
• Many of our classes are over 90% full and several are at/over capacity
• We WILL see the initial bulge in 2012-13 but this WILL continue to increase
• There is a gap between those who do most of teaching many of whom will retire and the newly recruited, who primarily are in research-intensive positions (CRCs etc.)
• There will be opportunities with retirements, increased enrolment, new UG modules, potential new interdisciplinary programs and graduate programs
• Key Question: **How do we Foster and Manage the Growth of this Premier Program?**
• Our mission is to provide outstanding education within a research-intensive environment where future physicians, dentists and health researchers learn to be socially responsible leaders in the advancement of human health. (C. Herbert, December 2009 Deans’ Meeting: “Make a Difference”).
• Start Planning NOW! (Break Out Groups)

**Group A: Departmental Chairs, Dean’s, COO**

1. **How to Optimize New Hires:**
   - Hire new instructors/faculty with different methods of teaching
   - Develop a new model for hiring
   - Students today are different and can adapt to different types of instruction
   - Do not replace the “Master” teacher – hires those with common competencies
   - Try to maximize use of Master teachers with web-broadcasts
   - CRC – increase teaching load
   - Make sure new hires meet Undergraduate (UUDLE)
   - Require new hires to have 75% teaching load
   - New hires can be assigned to different departments or pooled
   - Hire professors in continuing terms
   - Need to hire professor to teach interdisciplinary Medical Sciences course to pull Year 4 BMSc students together

2. **How to Optimize Space Utilization**
   - Use of online learning – Wimba – reduces need for classroom space, more students can be taught, increase revenue for departments
   - Must address need for large space to accommodate BMSc students and common Medical Sciences courses
   - Better classroom management – a more regular scheduling of classes (i.e. M,W,F or Tues/Thurs) may free up more classrooms
   - Renovations must incorporate new designs, layouts – not just bandaid solutions

3. **Funding stream effects on program**
   - Chairs were not familiar with the new funding formulae so could not comment
   - As funding will be related to enrolment, must keep programs vibrant to maintain or increase numbers
Group B: Undergraduate Chairs, TSC, Ivey

1. How to Enhance/Add Collaborative Programs:

- Combined BMSc/HBA program:
  - Well-received by students but both BMSc and HBA would like to increase the number of students in the combined program
  - The combined program only allows for participation of the Honors Specialization in Medical Sciences – could the discipline-specific Honors Specialization modules be included?
    - Issues with picking up a more specified third-year array of basic medical science courses and with the amount of time needed to complete the research project in Year 4
    - Basic medical science undergraduate chairs appear to be agreeable to a revision to the combined BMSc/HBA program to allow students the opportunity to complete a discipline-specific Honors Specialization module.
  - The combined program doesn't offer any collaborative courses (Ivey/BMSc) -- possibilities of offering more collaborative courses?
  - There is a lot of interest in the combined program at recruitment events but the number of students entering the combined program is relatively small compared to the number of students accepted into HBA after Year 2 of the BMSc program.
  - How to recruit more students? Increasing the effort put into recruiting students for the combined program should be considered once we know if there are additional opportunities available for students with the combined program as opposed to students having only an HBA degree.
  - When do we/should we begin conversations with students about alternative career paths if they entered university thinking only of medicine or dentistry? Does the combined program prepare students for (attractive) job opportunities immediately following graduation? If so, the combined program could be promoted as an alternative career path.
  - For students who are registered only in the BMSc program, is there a possibility of introducing collaborative, project-based courses in which the enrolment involves a ratio of HBA:BMSc students? Getting students to understand that there can be a relationship between business and science could be helpful in attracting students to the combined program or to the HBA program after completion of the BMSc program.
  - Is there a possibility for a professional Masters program?
  - Are there no extra costs to faculties in mounting and maintaining collaborative and combined programs?
  - What about the possibility of a combined program with Law?

2. How to develop NEW teaching Modules:

The undergraduate chairs were in agreement that we should find out the needs/wants of the “real world” before we attempt to create new modules. Once we
know if there is a need for graduates with different combinations of disciplines, we can look at creating new modules.

- Any new module would have to be coherent, with real connections between the disciplines
- The skills and objectives desired for the graduating students should be examined by each department to see if the courses they offer (or will offer) contain these skills/objectives. If not, the existing courses should be revised or new courses should be developed

3. **How to Evaluate the Success of changes:**

- We need to develop a list of objectives and skills for graduating BMSc students and evaluate whether or not they achieve these objectives and skills
- Student feedback is critical to evaluate our current status and any changes we implement
  - Student satisfaction survey
  - Student focus groups
- We must solicit feedback from the businesses, professional schools, graduate schools, etc. that employ/admit our graduating students to see if we have prepared the students adequately.
- One way to measure the success of change is to track student “placement” – how successful are our graduates in securing various job positions, in admission rates to graduate and professional programs, etc.

**Wrap-up and Closing Comments by Doug Jones**

- Volunteers needed for Task Force: a) from those attending, and b) from other departments.
- Mandates
  - to plan for 2020
  - plan to include courses (including delivery modes); faculty recruitment; space
  - to review/revise the position description of the Associate Dean, Basic Medical Sciences Academic Affairs
  - to develop a “White Paper” by the end of this calendar year
- Key Question: **How do we Foster and Manage the Growth of this Premier Program?**
Appendix 4: UUDLEs Appendix from the OCAC Vice Presidents

Appendix 3: University Undergraduate Degree Level Expectations

Preamble:
The globalization of higher education has led to the need to be able to compare and contrast the variety of qualifications granted by academic institutions for credit transfer, graduate study preparation and professional qualification. Similarly, jurisdictions with decentralized systems are looking for ways to measure academic equivalencies. In addition, in order to be able to evaluate and monitor the effectiveness of all aspects of instruction, institutions, accrediting authorities and funding bodies have begun to clarify the outcomes expected of graduates. In response to a national initiative to state degree expectations, the Executive Heads of Ontario’s publicly assisted universities asked OCAV to prepare a framework to reflect expectations of performance by the graduates of the Baccalaureate/Bachelors programs of Ontario’s publicly assisted universities. The document, “Guidelines for University Undergraduate Degree Level Expectations,” developed by the Ontario Council of Academic Vice-Presidents was subsequently endorsed by the Council of Ontario Universities on December 16, 2005.

The degree level expectations in OCAV’s “Guidelines” elaborate the intellectual and creative development of students and the acquisition of relevant skills that have been widely, yet implicitly, understood. Here they are explicitly stated. Ontario’s universities have agreed to use OCAV’s “Guidelines” as a threshold framework for the expression of their own degree level expectations, which will be consistent with this document -- or may indeed go beyond it. In articulating its statement of degree level expectations, each institution is free to use language that reflects its own mission, ethos, values and culture.

**OCAV October 12, 2006 UPRAC Review and Audit Guidelines Ontario Council of Academic Vice Presidents (OCAV) Guidelines for University Undergraduate Degree Level Expectations**

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<th>Baccalaureate/Bachelor's Degree</th>
<th>Baccalaureate/Bachelor's Degree: Honours</th>
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<tr>
<td>This degree is awarded to students who have demonstrated:</td>
<td>This degree is awarded to students who have demonstrated:</td>
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### 1. Depth and Breadth of Knowledge

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<th>Baccalaureate/Bachelor's Degree</th>
<th>Baccalaureate/Bachelor's Degree: Honours</th>
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<td>a) a general knowledge and understanding of many key concepts, methodologies, theoretical approaches and assumptions in a discipline</td>
<td>a) a developed knowledge and critical understanding of the key concepts, methodologies, current advances, theoretical approaches and assumptions in a discipline overall, as well as in a specialized area of a discipline</td>
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<td>b) a broad understanding of some of the major fields in a discipline, including, where appropriate, from an interdisciplinary perspective, and how the fields may intersect with fields in related disciplines</td>
<td>b) a developed understanding of many of the major fields in a discipline, including, where appropriate, from an interdisciplinary perspective, and how the fields may intersect with fields in related disciplines</td>
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<td>c) an ability to gather, review, evaluate and interpret information relevant to one or more of the major fields in a discipline</td>
<td>c) a developed ability to: i) gather, review, evaluate and interpret information; and ii) compare the</td>
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<td>2. Knowledge of Methodologies</td>
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<td>e) critical thinking and analytical skills inside and outside the discipline f) the ability to apply learning from one or more areas outside the discipline</td>
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<td>merits of alternate hypotheses or creative options, relevant to one or more of the major fields in a discipline d) a developed, detailed knowledge of and experience in research in an area of the discipline e) developed critical thinking and analytical skills inside and outside the discipline f) the ability to apply learning from one or more areas outside the discipline</td>
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<th>3. Application of Knowledge</th>
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<td>a) the ability to review, present, and interpret quantitative and qualitative information to: i) develop lines of argument; ii) make sound judgments in accordance with the major theories, concepts and methods of the subject(s) of study; and b) the ability to use a basic range of established techniques to: i) analyse information; ii) evaluate the appropriateness of different approaches to solving problems related to their area(s) of study; iii) propose solutions; and c) the ability to make use of scholarly reviews and primary sources.</td>
<td>a) the ability to review, present and critically evaluate qualitative and quantitative information to: i) develop lines of argument; ii) make sound judgments in accordance with the major theories, concepts and methods of the subject(s) of study; iii) apply underlying concepts, principles, and techniques of analysis, both within and outside the discipline; iv) where appropriate use this knowledge in the creative process; and b) the ability to use a range of established techniques to: i) initiate and undertake critical evaluation of arguments, assumptions, abstract concepts and information; ii) propose solutions; iii) frame appropriate questions for the purpose of solving a problem; iv) solve a problem or create a new work; and c) the ability to make critical use of scholarly reviews and primary sources.</td>
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<td>... an understanding of methods of enquiry or creative activity, or both, in their primary area of study that enables the student to: • evaluate the appropriateness of different approaches to solving problems using well established ideas and techniques; and • devise and sustain arguments or solve problems using these methods.</td>
<td>... an understanding of methods of enquiry or creative activity, or both, in their primary area of study that enables the student to: • evaluate the appropriateness of different approaches to solving problems using well established ideas and techniques; • devise and sustain arguments or solve problems using these methods; and describe and comment upon particular aspects of current research or equivalent advanced scholarship.</td>
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<td>4. Communication Skills</td>
<td>... the ability to communicate accurately and reliably, orally and in writing to a range of audiences.</td>
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<td>5. Awareness of Limits of Knowledge</td>
<td>... an understanding of the limits to their own knowledge and how this might influence their analyses and interpretations.</td>
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<td>6. Autonomy and Professional Capacity</td>
<td>a) qualities and transferable skills necessary for further study, employment, community involvement and other activities requiring: • the exercise of personal responsibility and decision-making; • working effectively with others; b) the ability to identify and address their own learning needs in changing circumstances and to select an appropriate program of further study; and c) behaviour consistent with academic integrity and social responsibility.</td>
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