AGENDA ITEM NO: 10.3

UNIVERSITY COUNCIL
ACADEMIC PROGRAMS COMMITTEE
REPORT FOR INFORMATION

PRESENTED BY: Susan Detmer; chair, academic programs committee

DATE OF MEETING: November 21, 2019

SUBJECT: Changes to the Biomedical Science programs in the College of Arts and Science

COUNCIL ACTION: For Information Only

SUMMARY:
At its October 24, 2019 meeting, the academic programs committee approved the following motions:

- That the Academic Programs Committee approve the Bachelor of Science (B.Sc.) in Biochemistry, Microbiology, and Immunology, effective May 2020.
- That the Academic Programs Committee approve the Bachelor of Science (B.Sc.) in Biomedical Neuroscience, effective May 2020.
- That the Academic Programs Committee approve the Bachelor of Science (B.Sc.) in Cellular, Physiological, and Pharmacological Sciences, effective May 2020.
- That the Academic Programs Committee approve the three-year Bachelor of Science (B.Sc.) in Biomedical Foundations, effective May 2020.
- That the Academic Programs Committee approve the deletion of the Bachelor of Science (B.Sc.) in Anatomy and Cell Biology, effective May 2020.
- That the Academic Programs Committee approve the deletion of the Bachelor of Science (B.Sc.) in Physiology and Pharmacology, effective May 2020.
- That the Academic Programs Committee approve the deletion of the Bachelor of Science (B.Sc.) in Microbiology and Immunology, effective May 2020.

In 2018, the five biomedical sciences (BMSC) departments were merged to form two new departments: the Department of Anatomy, Physiology and Pharmacology, and the Department of Biochemistry, Microbiology and Immunology. With these mergers, the College of Arts and Science has proposed changes to the BMSC undergraduate majors to align with these new structures.

The College of Arts and Science proposed four new BMSC majors: 1) Biochemistry, Microbiology and Immunology; 2) Cellular, Physiological, and Pharmacological Sciences; 3) Biomedical Neuroscience; and 4) a three-year program in Biomedical Foundations.
The new programs share a common multi-disciplinary two-year platform, with specialization occurring after that. Details of the new majors are presented in the attached program proposals.

The existing four BMSC majors will be deleted: 1) Biochemistry; 2) Anatomy and Cell Biology; 3) Microbiology; and 4) Physiology and Pharmacology. Students currently in the programs will be permitted to finish their programs and will be supported for up to ten years in doing so. No new students will be admitted into these programs.

The new BMSC majors all adhere to existing Arts and Science program templates and so required approval at the Academic Programs Committee (APC). APC approved these new majors and the deletion of the existing majors at its October 24, 2019 meeting.

ATTACHMENTS:
1. Biomedical Neuroscience and Cellular, Physiological and Pharmacological Sciences
2. Biochemistry, Microbiology and Immunology
3. Biomedical Foundations
4. Biomedical Sciences Program Proposals – General Information
PROPOSAL IDENTIFICATION

Title of proposal: Majors in Biomedical Neuroscience and Cellular, Physiological, and Pharmacological Sciences to replace existing majors in Anatomy and Cell Biology and Physiology and Pharmacology

Degree(s): Bachelor of Science

Field(s) of Specialization: Biomedical Neuroscience, Cellular, Physiological, and Pharmacological Sciences

Level(s) of Concentration: Honours and Four-year

Degree College: Arts & Science

Contact person(s) (name, telephone, fax, e-mail):

Dr. Scott Napper
Faculty; Department of Biochemistry, Microbiology, and Immunology; College of Medicine
Scientist and Science Management; Vaccine and Infectious Disease Organization-International Vaccine Research Center
University of Saskatchewan
Tel: (306) 966-1546; e-mail: scott.napper@usask.ca

Dr. Thomas Fisher
Department Head; Department of Anatomy, Physiology, and Pharmacology
College of Medicine
University of Saskatchewan
Tel: (306) 966-6528; e-mail: thomas.fisher@usask.ca

Proposed date of implementation: May 2020
Executive Summary: In July of 2018 the Departments of Anatomy & Cell Biology, Physiology, and Pharmacology merged to form the Department of Anatomy, Physiology, and Pharmacology (APP). The APP Department now seeks to update their undergraduate programs to reflect the strengths and priorities of the new department. This includes the introduction of new majors in Cellular, Physiological, and Pharmacological Sciences (CPPS), and in Biomedical Neuroscience (BMNS).

The merger to form the APP department created a large faculty complement of neuroscientists (approximately 12) and a pool of courses that are partially or entirely focused on neuroscience (seven). Building on the BMSC Platform, these courses can be combined with neuroscience courses offered in other departments to offer a very attractive program in Biomedical Neuroscience at the U of S.

The CPPS major is modelled on the existing Physiology and Pharmacology major, which has been the most heavily populated biomedical science major over recent years. CPPS builds on the priority of providing students with multi-disciplinary training within the foundational sciences (anatomy, physiology and pharmacology) that are critical to success in studying health professional programs as well as enabling careers within a spectrum of science-based activities.

Rationale for Program Change:

The biomedical sciences are highly-competitive, rapidly-evolving disciplines. As such, it is essential that training in these fields reflects contemporary content and priorities. With many common foundations, priorities, and investigative tools, the fields of Anatomy, Physiology, and Pharmacology are well-suited to co-exist within a shared department and teaching/research program. With that, in July 2018, through an overwhelmingly positive vote by our faculty, the Departments of Anatomy & Cell Biology, Physiology and Pharmacology merged to form the Department of Anatomy, Physiology, and Pharmacology (APP). The merged departmental structure offers numerous advantages including greater faculty numbers to ensure a more robust department, enhanced teaching and research synergies, and establishment of a stronger foundation for multi-disciplinary training. The APP Department now seeks to adapt their undergraduate programs to reflect these new opportunities through the development of two majors Biomedical Neuroscience and Cellular, Physiological, and Pharmacological Sciences, which will replace the majors of Anatomy & Cell Biology (ACB) and Physiology & Pharmacology (PHPY).
Biomedical Neuroscience

The proposed Neuroscience major formalizes the will of the faculty, matches current priorities within biomedical science education, matches student interest, leverages the unique infrastructure and expertise present at the U of S, and exemplifies the priorities of the University in the establishment of multi-disciplinary collaborations. Specifically, while there has been longstanding recognition of the opportunity for development of both undergraduate and graduate programs in neuroscience at the University of Saskatchewan this has been challenged by the separation of the neuroscience faculty within different departments and colleges. The recent merger creates a sufficient core of neuroscientists to serve as the foundation for development of a Biomedical Neuroscience major, which will include valuable contributions from other departments. The new major enables the success of graduates, promotes growth of biomedical research at the U of S, expands the pool of highly qualified candidates for graduate and professional programs, and achieves enrollment targets through recruitment of high-caliber students.

Overall Objectives of the BMNS Major:

- Provide learners with student-centric, multidisciplinary training.
- Inspire and enable careers within a spectrum of science-based activities.
- Develop skills that will serve them well in the workplace, namely critical thinking skills, communication (written and oral), collaboration and teamwork.
- Provide a strong foundational basis in biomedical sciences and research skills as well as serve as an inspiration for those students considering graduate training.
- Provide students with experiential learning opportunities.
- Reflect modern priorities in biomedical science education.
- Attract top-tier students, both nationally and internationally.
- Bolster the research capacities of our faculty.
- Enable enrollment growth for the U of S.

Key Curriculum Changes for the BMNS Major:

The BMNS major builds on the strengths of its predecessors, but with increased priority on multi-disciplinary training, experiential learning, and cutting-edge content. Students will move from the BMSC Platform to more specific training in BMNS within the third and fourth years. The course requirements for the major are carefully structured to ensure students receive multi-disciplinary training at the levels of the shared biomedical science platform of the first two years which provides students introductory level exposure to cell biology, biochemistry, microbiology, physiology and pharmacology, to advanced, and more specific exposure in their third and fourth years to neurophysiology and neuroscience, neuroanatomy, neurobiology of behavior and human neuropsychology, to name just a few of the options available.

The BMNS major represents a novel offering building on an established foundation of existing courses, both from within the APP department as well as from other academic units. The merger of Anatomy & Cell Biology, Physiology and Pharmacology provides the opportunity to plan around the neuroscience-related courses that have been offered in each of these departments, in combination with the neuroscience-related courses offered by other departments and colleges. These courses include BIOL430.3: Neurobiology of Behaviour, which has been included by mutual agreement with the Department of Biology, and PSY120.3 Biological and Cognitive Basis of Psychology; PSY 242.3: Physiological Psychology PSY 246.3: Human Neuropsychology; PSY 252.3 Perceptual Processes; PSY448.3: Advanced Seminar in Neuroscience, which were recommended for inclusion in discussions with the Department of Psychology. Discussions with the College of Kinesiology, regarding inclusion of a number of their courses, are ongoing, with any agreed upon courses to be included in future iterations of the
program. Collectively, there is already a large base of neuroscience courses to support this new major with the potential for further expansion of this pool.

Consistent with the majors being replaced, students within the BMNS major will have the option for an Honours degree based upon the completion of additional six credit undergraduate research project NEUR 432.6, and achievement of the required averages in the major and overall.

**Student Demand for BMNS Degree:**

At neuroscience-related public events such as the Brain Blast and Brain Bee during Brain Awareness Week it has become apparent that some high school students are actively seeking out neuroscience undergraduate programs and have indicated that the University of Alberta and University of Calgary are currently their closest options. The creation of such a program will allow the U of S to attract students from other provinces and retain excellent Saskatchewan students seeking such programs. This program will allow undergraduate students with an interest in the neurosciences to receive a tailored program exposing them to a wide variety of neuroscience topics and techniques. This major will initially be capped at approximately 40 students per year, a reflection of limitations imposed by access to cadaveric samples which are essential for the required ACB 334.3 Introductory Neuroanatomy course. Based on consultations with current students within the biomedical sciences majors we anticipate no difficulty in reaching this number. Student selection for the program will be based on academic average at the end of the two-year BMSC platform.

**Targeted Demographics of the BMNS major:**

The biomedical sciences typically attract highly-motivated students who are either pursuing careers in science or are seeking entry into professional schools (typically Medicine, Pharmacy, or Dentistry). We anticipate a similar foundation of students within the BMNS major. Within that, the declared interest specifically in Biomedical Neuroscience may translate into a greater portion of these students transitioning into graduate studies than the more general Cellular, Physiological, and Pharmacological Sciences major.

**Comparable Programs at the U of S:**

The other biomedical science majors – Biochemistry, Microbiology & Immunology (BMI) and Cellular, Physiological, and Pharmacological Sciences (CPPS) – would be the closest equivalent offerings at the U of S. While all the biomedical science majors share a common two-year platform, they are quite distinct in their upper year priorities. In particular, with a heavy emphasis on understanding life a molecular level, the BMI major will be quite distinct from BMNS. Further, the CPPS and BMNS will differ in terms of the specific priorities as well as depth and breadth of knowledge; BMNS focussing on depth of knowledge in one specific area while CPPS prioritizing breadth of knowledge across a range of disciplines.

Outside the biomedical sciences, Health Studies is likely the closest competing program at the U of S. Similar to some of the BMNS students, many students of the Health Studies program aspire to enter medical school. There is also some course overlap, especially with the Biology, Development and Health stream, but the programs are, however, quite distinct in their upper year requirements. The BMNS major places heavy emphasis on biomedical (natural) science courses with specific relation to neurosciences. In contrast, the Health Studies program strives for a more holistic perspective with a much broader interdisciplinary scope. Indeed, the Health Studies program is self-described as “a distinct interdisciplinary undergraduate program that builds on and combines science, social sciences, and humanities/fine arts.” The expanded scope of this program (relative to BMNS) is achieved through shared priority for courses in the humanities and social sciences, and the sciences. As such, Health Studies and BMNS represent quite unique educational experiences largely catering to distinct populations of students.
While there are a number of departments and colleges with courses relating to neuroscience, there are no formal majors in this area. The priority in developing this Biomedical Neuroscience major was to collaborate, rather than compete, with these offerings. Specifically, consultations with Biology and Psychology have led to the inclusion of select courses from their programs into the BMNS major. Additionally, the availability of our courses to support their programs and students has been emphasized in these discussions.

**Comparable Programs in Saskatchewan:**

There are no other comparable programs within Saskatchewan. The closest in-province alternative would be at the University of Regina, which offers degrees in biology as well as chemistry/biochemistry, but these are not comparable alternatives to the proposed major.

**Comparable Programs in Canada:**

Most Canadian Universities, in particular those with medical schools, offer degrees within the various biomedical sciences. Further, many Canadian Universities have moved towards a multidisciplinary approach to biomedical science education. Updated programs, like BMNS, are essential for us to compete with these schools, both for retention of local students as well as to attract students on national and international scales.

Many Universities in Canada have created neuroscience undergraduate programs [Table 1] and a few have even created neuroscience academic departments.

**Examples of Neuroscience degrees offered across Canada.**

<table>
<thead>
<tr>
<th>Degree Offered</th>
<th>University</th>
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<tbody>
<tr>
<td>B.Sc. Neuroscience</td>
<td>Laurentian University</td>
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<tr>
<td></td>
<td>McGill University</td>
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<td></td>
<td>University of Toronto</td>
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<td>University of Calgary</td>
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<td>University of Lethbridge</td>
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<td>Dalhousie University</td>
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<td>University of New Brunswick</td>
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<td></td>
<td>Brock University</td>
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<td></td>
<td>University of Alberta</td>
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<tr>
<td>B.Sc. Behaviour, Cognition and Neuroscience</td>
<td>University of Windsor</td>
</tr>
<tr>
<td>B.Sc. Neuroscience and Mental Health</td>
<td>Carleton University</td>
</tr>
<tr>
<td>B.Sc. Psychology, Neuroscience &amp; Behaviour</td>
<td>McMaster University</td>
</tr>
<tr>
<td>B.Sc. Behavioural Neuroscience</td>
<td>Memorial University</td>
</tr>
<tr>
<td></td>
<td>University of British Columbia</td>
</tr>
</tbody>
</table>

Comparison to other Canadian institutions:
- Of the neighbouring U15 Universities; the University of Alberta and University of Calgary currently have undergraduate neuroscience programs; the University of Manitoba does not.
- The proposed program shares many similarities with both U of A and U of C’s programs.
All three programs cover core aspects of neuroscience in the mandatory course offerings including neurophysiology, neuroanatomy, and neuropharmacology, as well as systems, behavioural and cognitive neuroscience.

- The BMSC core used in the U of S programs provides students an increased breadth in the biomedical sciences.

Potential Impacts on Other Academic Programs:

The new BMNS major is not anticipated to have any negative consequences for other academic programs or units, as the majority of the required courses for the BMNS major are carried forward from the previous, separate programs in Anatomy & Cell Biology and Physiology & Pharmacology. This includes the introductory and related courses taught by other departments, all of which have been consulted about the proposed updates. The Department of Philosophy has been specifically consulted regarding inclusion of PHIL 140.3 (Critical Thinking), and they have offered their support. The Departments of Psychology and History have been consulted regarding inclusion of HLST 110.3 (Introduction to Health Studies) and HIST 165.3 (History Matters: Health and Society), respectively, as recommended electives in the program, and each has offered support for these selections.

BMNS utilizes a variety of neuroscience-related courses of Psychology and Biology which will have enrollment benefits, attract attention to their neuroscience courses and faculty, and represent the ideal of different departments and colleges working together towards a common academic goal. It is hoped that this spirit of collaboration will evolve into a cross-campus graduate program in Neuroscience.

Alignment with University and College Priorities:

The BMNS major directly aligns with the strategic plans of the university and COM, in particular to strengthen research capacity and to grow a strong cohort of excellent learners/researchers who will enhance both health science professional and graduate programs. The update to the BMSC programs is specifically highlighted in the area of Strengthening Research Capacity in the COM strategic plan. Our goal is to implement undergraduate majors that stimulate graduate student and faculty research programs. In addition, the undergraduate programs will work to encourage and expand collaborations – both interdisciplinary and within college basic science/clinical areas. In particular, we are collaborating with the departments of Community Health and Epidemiology, and Pathology to offer undergraduate courses in Epidemiology and Pathology.

Knowledge Creation:

A central priority of the new major is to contribute to a vibrant and robust research environment within the COM. Many of the graduate students within the research labs of the biomedical science faculty are alumni of our own undergraduate programs. As such there is self-serving motivation to ensure these individuals receive the highest caliber of training to best prepare them for success as researchers. While it is relatively easy to train students to be proficient in a range of techniques, the greater value is in equipping these individuals with the skills required to make higher-level contributions to research. The new program, through emphasis on critical thinking, experiential learning, and training in cutting edge research techniques, is designed to enable the training of such individuals. The opportunities provided will also serve to attract students (provincially, nationally, and internationally) to our campus. We anticipate that the proposed program generate a body of highly trained, interested students that can transition into graduate programs across the institution, thereby having a positive impact on enrolment rates within graduate programs across campus.
Innovation in Academic Programs and Services:

Within the new major there is a priority for multidisciplinary training that is presented within the context of a revamped curriculum that prioritizes innovative lab experiences in cutting-edge technologies and new opportunities for experiential learning. The new program also brings forth innovative approaches to academic services through the development of a number of online courses designed to accommodate students from outside of Saskatoon or with limited access to traditional classes. Currently, BMSC 200.3, BMSC 230.3, and PHSI 208.6 (to become BMSC 207.3/208.3 in 2020-21) are available as online courses with further plans to make other courses of the common BMSC Platform available in online formats.

Resources:

No additional financial or personnel resources are required for the BMNS major.
Cellular, Physiological, and Pharmacological Sciences

The proposed CPPS program will benefit students through a variety of increasingly advanced courses, including laboratory courses that facilitate critical thinking skills, communication (written and oral) and teamwork. The combined CPPS program will present an opportunity for students to develop a solid understanding of the three most relevant biomedical sciences (anatomy, physiology, pharmacology) as preparation for future study in a health discipline. The merger of the PHPY and ACB programs would also provide opportunities to integrate knowledge among three disciplines that have traditionally been very closely linked to each other. The research opportunities offered through the Honours program as well as skills developed in lab courses and senior courses will facilitate achievement of preparing students for research careers. Finally, merging the PHPY and ACB programs into CPPS will also position the UofS to remain highly competitive with neighbouring institutions, which either lack the depth or breadth of the proposed CPPS major in their undergraduate offerings.

When compared to neighbouring U15 institutions, the proposed CPPS major will offer a valuable balance of depth and breadth for those students most interested in the disciplines that are considered to be most central to those seeking a health profession: anatomy, physiology and pharmacology. Coupled with the critical thinking skills, communication and teamwork skills, as well as novel initiatives such as the proposed introduction to the business side of health care, the CPPS major will also improve the workplace marketability for those students wishing to enter the job market immediately after their degree. Research opportunities within the CPPS major, as well as the foundational science knowledge and workplace skills noted above will also enhance skills needed for those wishing to enter graduate studies. The merged CPPS program would also leverage the strengths of the newly merged APP department, and serve as a unifying force to facilitate collaboration and teamwork among faculty within APP.

The proposed CPPS major change formalizes the will of the faculty, matches current priorities within biomedical science education, matches student demand, leverages the unique infrastructure and expertise present at the U of S, and exemplifies the priorities of the University in the establishment of multi-disciplinary collaborations. The new major enables the success of our graduates, promotes growth of biomedical research at the U of S, expands the pool of highly qualified candidates for our graduate and professional programs, and achieves enrollment targets through recruitment of high-caliber students.

Overall Objectives of the CPPS Major:

- Provide learners with student-centric, multidisciplinary training.
- Inspire and enable careers within a spectrum of science-based activities.
- Develop skills that will serve them well in the workplace, namely critical thinking skills, communication (written and oral), collaboration and teamwork.
- Provide students with a strong basis in the foundational sciences (anatomy, physiology and pharmacology) that are critical to success in studying health professional programs.
- Provide a strong foundational basis in biomedical sciences and research skills as well as serve as an inspiration for those students considering graduate training.
- Provide students with experiential learning opportunities.
- Reflect modern priorities in biomedical science education.
- Attract top-tier students, both nationally and internationally.
- Bolster the research capacities of our faculty.
- Enable enrollment growth for the U of S.
Key Curriculum Changes for the CPPS Major:

This new CPPS degree builds on the strengths of its predecessors but with increased priority on multi-disciplinary training, experiential learning, and cutting-edge content. Students will move from the BMSC Platform to more specific, yet still multidisciplinary, training in the areas of Anatomy, Physiology, and Pharmacology within the third and fourth years.

The curriculum requirements of the CPPS major are guided by the priority to provide students with multi-disciplinary training within the foundational sciences (anatomy, physiology and pharmacology) that are critical to success in studying health professional programs as well as enabling careers within a spectrum of science-based activities. In large part, the CPPS major builds on the philosophy and course structure of the existing, highly successful Physiology & Pharmacology and Anatomy & Cell Biology majors to provide students a greater number and variety of courses to choose from while ensuring a solid foundation of multi-disciplinary training within the foundational sciences that are critical to success in studying health professional programs as well as enabling careers within a spectrum of science-based activities. Within this, however, there will be adaptations of existing courses as well as introduction of new course offerings. Specifically, PHPY 402.3 Therapeutic Herbal Compounds and Evidence based Medicine will evolve into CPPS 337.3 Experimental Design and the Health Care System with greater emphasis on critical thinking and experimental design.

Consistent with the majors being replaced, students within the CPPS major will have the option for an Honours degree based upon completion of a research project (CPPS 432.6) and the Current Topics in Cell Biology, Physiology, and Pharmacology course (CPPS 405.3), and achievement of the required averages in the major and overall.

Student Demand for CPPS Degree:

Over the past 5 years the Physiology & Pharmacology and Anatomy & Cell Biology programs have respectively graduated 156 and 29 students on average per year. The new CPPS major is anticipated to build on the sum of these programs. In particular, the Physiology & Pharmacology major has been the most heavily populated of the biomedical science programs. Based on this, and with the improvements to the curriculum, a moderate increase in student enrollment in CPPS beyond the current total of the individual Physiology & Pharmacology and Anatomy & Cell Biology programs is anticipated. The department has capacity to accommodate this growth.

Targeted Demographics of the CPPS major:

The biomedical sciences typically attract highly-motivated students who are either pursuing careers in science or are seeking entry into professional schools (typically Medicine, Pharmacy, or Dentistry). We anticipate a similar foundation of students within the CPPS major.

Comparable Programs at the U of S:

The other biomedical science majors – Biochemistry, Microbiology & Immunology (BMI) and Biomedical Neuroscience – would be the closest equivalent offerings at the U of S. While all the biomedical science majors share a common two-year platform, they are quite distinct in their upper year priorities. In particular, with a heavy emphasis on understanding life on a molecular level, the BMI major will be quite distinct from the CPPS major. Further, the CPPS and BMNS majors will be different in terms of the specific priorities as well as depth and breadth of knowledge; BMNS focussing on depth of knowledge in one specific area while CPPS prioritizes breadth of knowledge across a range of disciplines.
Health Studies is likely the closest comparable program at the U of S. Similar to some of the CPPS students, many students of the Health Studies program aspire to enter medical school. There is also some course overlap, especially with the Biology, Development and Health stream, but the programs are, however, quite distinct in their upper year requirements. The CPPS major places heavy emphasis on biomedical (natural) science courses. In contrast, the Health Studies program strives for a more holistic perspective with a much broader interdisciplinary scope. Indeed, the Health Studies program is self-described as “a distinct interdisciplinary undergraduate program that builds on and combines science, social sciences, and humanities/fine arts.” The expanded scope of the Health Studies program, relative to CPPS, is achieved through shared priority for courses in the humanities and social sciences, and the sciences. As such, Health Studies and CPPS represent quite unique educational experiences largely catering to distinct populations of students.

Comparable Programs in Saskatchewan:

There are no other comparable programs within Saskatchewan. The closest in-province alternative would be at the University of Regina, which offers degrees in biology as well as chemistry/biochemistry. In terms of depth, breadth, and scope, this is not a comparable alternative to the proposed CPPS major.

Comparable Programs in Canada:

Most Canadian Universities, in particular those with medical schools, offer degrees within the various biomedical sciences. Further, many Canadian Universities have moved towards a multidisciplinary approach to biomedical science education. Updated programs, like CPPS, are essential for us to compete with these schools, both for retention of local students as well as to attract students on national and international scales.

The University of Manitoba (UM) has a Biomedical Sciences Concentration within their Bachelors in Health Sciences (BHSc) program, however enrollment is capped at 24 students per cohort. The BHSc program is heavily weighted towards the social sciences (epidemiology, determinants of health, research methods) and the Biomedical concentration appears to simply add chemistry and biology courses to that mix. The Department of Pharmacology offers two pharmacology courses (Drugs in Human Disease I and II) that are open to undergraduate students from Science and other faculties, so presumably these could be taken as electives in the BHSc program. However there does not appear to be an option to specialize in Anatomy, Physiology or Pharmacology at UM. Thus, UM has only a small program with biomedical science specialization and little depth or breadth in Anatomy, Physiology or Pharmacology within that program.

The University of Alberta (UA) allows for undergraduate specializations within the Faculty of Science, and students can therefore specialize in Pharmacology, however it does not appear that there is an option to specialize in Anatomy per se, although a specialization in Cell Biology is available. Although an honours program in Physiology once existed, it is not clear whether that still exists. The undergraduate specialization in Pharmacology offers a wide range of pharmacology courses, with about a dozen offerings ranging from introductory courses to systems (e.g. cardiovascular) and disease based (e.g. diabetes) courses. The Cell Biology program appears to be a mixture of courses from a variety of disciplines (e.g. biology, biochemistry, chemistry, cell biology, genetics, microbiology, and math). Electives are also available from other disciplines including physiology and pharmacology. Therefore, the UA offers great depth in a particular field (Pharmacology) and it appears that their Cell Biology specialization would be the one most closely related to CPPS, albeit with much less focus.

The University of Calgary (UC) offers a Medical Sciences (MDSc) undergraduate program, and of the nearest comparator universities, this most closely resembles the proposed CPPS program. The MDSc program offers courses across the health disciplines (e.g. pharm, physiology, anatomy, molecular biology,
There is also a self-directed research project within an integrated research course, with projects falling under one of the following: genetics, microbiology, cardiovascular, cancer, biochemistry and molecular biology, pharmacology and physiology, neuroscience, or special topics. The MDSc program has a longer history and more courses offered than the UofS however the program appears to provide less opportunity for depth of study within the disciplines (e.g. pharmacology) and thus may more closely resemble the interdisciplinary program we plan to propose at a later date.

**Potential Impacts on Other Academic Programs:**

The new CPPS major is not anticipated to have any negative consequences for other academic programs or units, as the majority of the required courses for the CPPS major are carried forward from the previous, separate programs in Anatomy & Cell Biology and Physiology and Pharmacology. This includes the introductory and related courses taught by other departments, all of which have been consulted about the proposed updates. The Department of Philosophy has been specifically consulted regarding inclusion of PHIL 140 (Critical Thinking), and they have offered their support. The Departments of Psychology and History have been consulted regarding inclusion of HLST 110.3 (Introduction to Health Studies) and HIST 165.3 (History Matters: Health and Society), respectively, as recommended electives in the program, and each has offered support for these selections.

**Alignment with University and College Priorities:**

The CPPS major directly aligns with the strategic plans of the university and COM, in particular to strengthen research capacity and to grow a strong cohort of excellent learners/researchers who will enhance both health science professional and graduate programs. The update to the BMSC programs is specifically highlighted in the area of Strengthening Research Capacity in the COM strategic plan. Our goal is to implement undergraduate majors that stimulate graduate student and faculty research programs. In addition, the undergraduate programs will work to encourage and expand collaborations – both interdisciplinary and within college basic science/clinical areas. In particular, we are collaborating with the departments of Community Health and Epidemiology and Pathology to offer undergraduate courses in Epidemiology and Pathology.

**Knowledge Creation:**

A central priority of the new major is to contribute to a vibrant and robust research environment within the COM. Many of the graduate students within the research labs of the biomedical science faculty are alumni of our own undergraduate programs. As such there is self-serving motivation to ensure these individuals receive the highest caliber of training to best prepare them for success as researchers. While it is relatively easy to train students to be proficient in a range of techniques, the greater value is in equipping these individuals with the skills required to make higher-level contributions to research. The new program, through emphasis on critical thinking, experiential learning, and training in cutting edge research techniques, is designed to enable the training of such individuals. The opportunities provided will also serve as a strong incentive to recruit students (provincially, nationally, and internationally) to our campus.

**Innovation in Academic Programs and Services:**

Within the new major there is a priority for multidisciplinary training that is presented within the context of a revamped curriculum that prioritizes innovative lab experiences in cutting-edge technologies and new opportunities for experiential learning. The new program also brings forth innovative approaches to academic services through the development of a number of online courses designed to accommodate students from outside of Saskatoon or with limited access to traditional classes. Currently, BMSC 200.3,
BMSC 230.3, and PHSI 208.6 (to become BMSC 207.3/208.3 in 2020-21) are available as online courses with further plans to make other courses of the common BMSC Platform available in online formats.

Resources:
No additional financial or personnel resources are required for the CPPS major.
Program(s) to be deleted:  Anatomy and Cell Biology – Bachelor of Science Honours, Double Honours, Four-year and Three-year
Physiology and Pharmacology – Bachelor of Science Honours, Four-year and Three-year

Effective date of termination:  May 2020

1. List reasons for termination and describe the background leading to this decision.

The Department of Anatomy, Physiology and Pharmacology is proposing to replace the Anatomy and Cell Biology, and the Physiology & Pharmacology programs with two new programs in Biomedical Neuroscience and in Cellular, Physiological, and Pharmacological Sciences. The new programs will offer both Honours and Four-year options. A Three-year program in Biomedical Foundations is also proposed, as a replacement for the current Three-year options in each major.

2. Technical information.

2.1 Courses offered in the program and faculty resources required for these courses.

Most of the current courses will continue to be used in the new programs; seminar and research courses built for the old majors will be replaced by similar courses built for the new majors. Faculty teaching requirements will remain virtually unchanged compared to now.

2.2 Other resources (staff, technology, physical resources, etc) used for this program.

There are no positions or other resources used in these programs that will not be used for the proposed programs.

2.3 Courses to be deleted, if any.

ACB 333.3 (Cellular Neurobiology) will be deleted, due to the retirement of David Schreyer. Much of the content from this course is covered in other courses, such as PHPY 301 and HSC 350 (each of which is to be relabeled to the “NEUR” subject code).

2.4 Number of students presently enrolled.

2018-19
Anatomy and Cell Biology: 162  
Physiology & Pharmacology: 497

2.5 Number of students enrolled and graduated over the last five years.

<table>
<thead>
<tr>
<th>Headcount</th>
<th>Anatomy and Cell Biology</th>
<th>Physiology and Pharmacology</th>
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<td>145</td>
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3. Impact of the termination.

3.1 What if any impact will this termination have on undergraduate and graduate students?  
How will they be advised to complete their programs?

Existing students will be allowed to complete the current program, or they may choose to switch to the new program, per Arts & Science policy.

3.2 What impact will this termination have on faculty and teaching assignments?

None. All services teaching that is currently offered will continue to be offered.

3.3 Will this termination affect other programs, departments or colleges?

No other departments or colleges will be affected. All courses offerings will remain the same, and students will still be free to take them as electives.

3.4 If courses are also to be deleted, will these deletions affect any other programs?

No effect on other programs.

3.5 Is it likely, or appropriate, that another department or college will develop a program to replace this one?

Replacement programs are being proposed concurrently.
3.6 Is it likely, or appropriate, that another department or college will develop courses to replace the ones deleted?

N/A

3.7 Describe any impact on research projects.

None.

3.8 Will this deletion affect resource areas such as library resources, physical facilities, and information technology?

No effect. Replacement programs will use the same resources as the old programs.

3.9 Describe the budgetary implications of this deletion.

Most courses remain the same or are replaced by program-focused versions. Changes to the budget should be net zero.

External

3.10 Describe any external impact (e.g. university reputation, accreditation, other institutions, high schools, community organizations, professional bodies).

The replacement of the ACB and PHPY programs with the new BMNS and CPPS programs are anticipated to enhance the university’s reputation, as the new programs are anticipated to be at least as popular as the old programs.

It will be important to communicate with external stakeholders, such as high schools and regional colleges, to make potential students aware of the program changes.

3.11 Is it likely or appropriate that another educational institution will offer this program if it is deleted at the University of Saskatchewan?

Replacement programs are being proposed concurrently.

Other

3.12 Are there any other relevant impacts or considerations?

No.

3.13 Please provide any statements or opinions received about this termination.

Please see Consultation.
College Statement

From Gordon DesBrisay, Vice Dean Academic

I am pleased to confirm that the College of Arts and Science supports creation of programs in Biomedical Neuroscience and in Cellular, Physiological, and Pharmacological Sciences to replace the existing programs in Anatomy and Cell Biology and in Physiology and Pharmacology.

The College of Arts and Science is working to provide innovative program options that meet student need and demand. The merger of the Departments of Anatomy and Cell Biology; Pharmacology; and Physiology has created the opportunity for these groups of faculty to work together on these new programs. The new programs continue the tradition of offering high-quality education in these areas, but provide updated choices for students, which will allow graduates more options for future study or employment. The introduction of the “NEUR” (Neuroscience) subject code will allow these departments, and others across the university, to highlight course offerings in this area, which has been identified as one that is desired by incoming students.

The Academic Programs Committee (BSc) approved the proposals to create the new major and to delete the old majors on September 24, 2019, as did the College Faculty Council on October 10, 2019.
Program Description

Biomedical Neuroscience

The Department of Anatomy, Physiology and Pharmacology programs provide education in the discipline of neuroscience. This program includes education in many of the major topics in neuroscience including molecular and cellular neuroscience, systems and sensory neuroscience, behavioural and cognitive neuroscience, neurophysiology and neuroanatomy. Programs in Anatomy, Physiology and Pharmacology include essential prerequisite courses for life science professional schools (e.g. Medicine, Dentistry, Pharmacy and Nutrition, Veterinary Medicine) and while this program focuses on neuroscience it prepares students for graduate studies in many areas of the life sciences. Graduates at all levels find employment in academia, industry and other life science research enterprises.

The four B.Sc. degree programs listed below share a set of courses (the Biomedical Science Common Core) which are to be taken in years 1 & 2. These courses have been incorporated into the C1-C5 requirements.

Biochemistry, Microbiology & Immunology
Biomedical Foundations
Cellular, Physiological and Pharmacological Sciences
Biomedical Neuroscience

Major Average

The major average in Biomedical Neuroscience programs includes the grades earned in:

- All courses listed in the Major Requirement C4.

Residency Requirements in the Major

To receive a degree in Biomedical Neuroscience, students must complete at least two-thirds of the following coursework (to the nearest highest multiple of 3 credit units) from the University of Saskatchewan.

- Minimum requirements in Major Requirement C4.

See Residency for additional details.
Bachelor of Science Honours (B.Sc. Honours) – Biomedical Neuroscience

No more than 6 credit units from one subject may be used in Requirements C1 to C3.

C1 College Requirement (15 credit units)

English Language Writing
Choose 6 credit units from the following:
- Approved list

Indigenous Learning
Choose 3 credit units from the following:
- Approved list

Quantitative Reasoning
Choose 3 credit units from the following:
- MATH 110.3
- MATH 125.3 (recommended)

Choose 3 credit units from the following:
- STAT 245.3
- STAT 246.3
- PLSC 214.3

C2 Breadth Requirement (3 credit units)
- PHIL 140.3

C3 Cognate Requirement (21 credit units)
- BIOL 120.3
- CHEM 112.3
- CHEM 115.3
- PHYS 115.3
- PHYS 117.3 or PHYS 125.3

Required Cognate Courses
- PSY 120.3

Choose 3 credit units from the following:
- HLST 110.3
- PSY 121.3
- SOC 111.3
- SOC 112.3
C4 Major Requirement (66 credit units)

- ACB 325.3
- ACB 334.3
- ACB 405.3
- BIOL 226.3
- BMSC 200.3
- BMSC 207.3 (Human Body Systems I)
- BMSC 208.3 (Human Body Systems II)
- BMSC 210.3
- BMSC 220.3
- BMSC 230.3
- BMSC 240.3
- CHEM 250.3
- NEUR 350.3 (Fundamental Neuroscience)
- NEUR 432.6 (Undergraduate Research Project in Neuroscience)
- PHPY 301.3
- PHPY 304.3
- PHPY 305.3

Choose 3 credit units from the following:

- ACB 331.3
- PHPY 308.3

Choose 3 credit units from the following:

- BIOL 430.3
- PHPY 404.3
- PSY 448.3

Choose 6 credit units from the following:

- PSY 242.3
- PSY 246.3
- PSY 252.3

C5 Electives Requirement (15 credit units)

Arts and Science courses, or those from other Colleges that have been approved for Arts and Science credit, to complete the requirements for 120 credit unit Honours program, of which at least 66 must be at the 200-level or higher.

Students are advised to consider the following list of recommended electives:

- HLST 210.3
- PSY 242.3
- PSY 246.3
- PSY 252.3
- PSY 253.3
- PSY 255.3
- PSY 256.3
Bachelor of Science Four-year (B.Sc. Four-year) – Biomedical Neuroscience

No more than 6 credit units from one subject may be used in Requirements C1 to C3.

C1 College Requirement (15 credit units)

English Language Writing

Choose 6 credit units from the following:
- Approved list

Indigenous Learning

Choose 3 credit units from the following:
- Approved list

Quantitative Reasoning

Choose 3 credit units from the following:
- MATH 110.3
- MATH 125.3

Choose 3 credit units from the following:
- STAT 245.3
- STAT 246.3
- PLSC 214.3

C2 Breadth Requirement (3 credit units)

- PHIL 140.3

C3 Cognate Requirement (21 credit units)

- BIOL 120.3
- CHEM 112.3
- CHEM 115.3
- PHYS 115.3
- PHYS 117.3 or PHYS 125.3

Required Cognate Courses

- PSY 120.3

Choose 3 credit units from the following:
- HLST 110.3
- PSY 121.3
- SOC 111.3
- SOC 112.3
C4 Major Requirement (60 credit units)

- ACB 325.3
- ACB 334.3
- ACB 405.3
- BIOL 226.3
- BMSC 200.3
- BMSC 207.3 (Human Body Systems I)
- BMSC 208.3 (Human Body Systems II)
- BMSC 210.3
- BMSC 220.3
- BMSC 230.3
- BMSC 240.3
- CHEM 250.3
- NEUR 350.3 (Fundamental Neuroscience)
- PHPY 301.3
- PHPY 304.3
- PHPY 305.3

Choose 3 credit units from the following:

- ACB 331.3
- PHPY 308.3

Choose 3 credit units from the following:

- BIOL 430.3
- PHPY 404.3
- PSY 448.3

Choose 6 credit units from the following:

- PSY 242.3
- PSY 246.3
- PSY 252.3

C5 Electives Requirement (21 credit units)

Arts and Science courses, or those from other Colleges that have been approved for Arts and Science credit, to complete the requirements for 120 credit unit Four-year program, of which at least 66 must be at the 200-level or higher.

Students are advised to consider the following list of recommended electives:

- HLST 210.3
- PSY 242.3
- PSY 246.3
- PSY 252.3
- PSY 253.3
- PSY 255.3
- PSY 256.3
Cellular, Physiological, and Pharmacological Sciences

The Department of Anatomy, Physiology and Pharmacology programs provide education in disciplines of the anatomical sciences (cell biology, developmental biology, and gross anatomy), physiology and pharmacology. These life science disciplines provide a comprehensive understanding of the functions and mechanisms of actions of the cells and major systems of the human body, and of the effects and mode of action of chemicals which modify the major systems of the body. Programs in Biochemistry include essential prerequisite courses for life science professional schools (e.g. Medicine, Dentistry, Pharmacy and Nutrition, Veterinary Medicine) and graduate studies in many areas of the life sciences. Graduates at all levels find employment in academia, industry and other life science research enterprises.

The four B.Sc. degree programs listed below share a set of courses (the Biomedical Science Common Core) which are to be taken in years 1 & 2. These courses have been incorporated into the C1-C5 requirements.

Biochemistry, Microbiology & Immunology
Biomedical Foundations
Biomedical Neuroscience
Cellular, Physiological and Pharmacological Sciences

Major Average

The major average in Cellular, Physiological and Pharmacological Sciences programs includes the grades earned in:

- All courses listed in the Major Requirement C4.

Residency Requirements in the Major

To receive a degree in Cellular, Physiological and Pharmacological Sciences, students must complete at least two-thirds of the following coursework (to the nearest highest multiple of 3 credit units) from the University of Saskatchewan.

- Minimum requirements in Major Requirement C4.

See Residency for additional details.
Bachelor of Science Honours (B.Sc. Honours) – Cellular, Physiological, and Pharmacological Sciences

No more than 6 credit units from one subject may be used in Requirements C1 to C3.

C1 College Requirement (15 credit units)

English Language Writing

Choose 6 credit units from the following:
- Approved list

Indigenous Learning

Choose 3 credit units from the following:
- Approved list

Quantitative Reasoning

Choose 3 credit units from the following:
- MATH 110.3
- MATH 125.3

Choose 3 credit units from the following:
- STAT 245.3
- STAT 246.3
- PLSC 214.3

C2 Breadth Requirement (3 credit units)

Choose 3 credit units from the following areas.
- Fine Arts
- Humanities
- Social Sciences
- Courses with No Program Type

C3 Cognate Requirement (21 credit units)

- BIOL 120.3
- CHEM 112.3
- CHEM 115.3
- PHYS 115.3
- PHYS 117.3 or PHYS 125.3

Required Cognate Courses

- PHIL 140.3
Choose 3 credit units from the following:

- HLST 110.3
- PSY 120.3
- PSY 121.3
- SOC 111.3
- SOC 112.3

C4 Major Requirement (66 credit units)

- ACB 310.3
- ACB 325.3
- BIOL 226.3
- BMSC 200.3
- BMSC 207.3
- BMSC 208.3
- BMSC 210.3
- BMSC 220.3
- BMSC 230.3
- BMSC 240.3
- CHEM 250.3
- CPPS 432.6 (Undergraduate Research Project in Cellular Physiological and Pharmacological Sciences)
- PHPY 302.3
- PHPY 303.3
- PHPY 304.3
- PHPY 305.3

Choose 3 credit units from the following:

- ACB 331.3
- PHPY 308.3

Choose 6 credit units from the following:

- ACB 330.3
- CPPS 337.3 (Experimental Design and the Health Care System)
- NEUR 350.3 (Fundamental Neuroscience)
- PHPY 301.3

Choose 6 credit units from the following:

- ACB 400.3
- ACB 405.3
- ACB 406.3
- NEUR 404.3 (Advances in Neurophysiology and Neuropharmacology)
- PHPY 401.3
- PHPY 403.3
- PHPY 405.3
C5 Electives Requirement (15 credit units)

Arts and Science courses, or those from other Colleges that have been approved for Arts and Science credit, to complete the requirements for 120 credit unit Four-year program, of which at least 66 must be at the 200-level or higher.

- HLST 210.3 is recommended.

Bachelor of Science Four-year (B.Sc. Four-year) – Cellular, Physiological, and Pharmacological Sciences

No more than 6 credit units from one subject may be used in Requirements C1 to C3.

C1 College Requirement (15 credit units)

English Language Writing

Choose 6 credit units from the following:

- Approved list

Indigenous Learning

Choose 3 credit units from the following:

- Approved list

Quantitative Reasoning

Choose 3 credit units from the following:

- MATH 110.3
- MATH 125.3

Choose 3 credit units from the following:

- STAT 245.3
- STAT 246.3
- PLSC 214.3

C2 Breadth Requirement (3 credit units)

Choose 3 credit units from the following areas.

- Fine Arts
- Humanities
- Social Sciences
- Courses with No Program Type

C3 Cognate Requirement (21 credit units)

- BIOL 120.3
- CHEM 112.3
- **CHEM 115.3**
- **PHYS 115.3**
- **PHYS 117.3 or PHYS 125.3**

**Required Cognate Courses**

- **PHIL 140.3**

Choose 3 **credit units** from the following:

- **HLST 110.3**
- **PSY 120.3**
- **PSY 121.3**
- **SOC 111.3**
- **SOC 112.3**

**C4 Major Requirement (60 credit units)**

- **ACB 310.3**
- **ACB 325.3**
- **BIOL 226.3**
- **BMSC 200.3**
- **BMSC 207.3**
- **BMSC 208.3**
- **BMSC 210.3**
- **BMSC 220.3**
- **BMSC 230.3**
- **BMSC 240.3**
- **CHEM 250.3**
- **PHPY 302.3**
- **PHPY 303.3**
- **PHPY 304.3**
- **PHPY 305.3**

Choose 3 **credit units** from the following:

- **ACB 331.3**
- **PHPY 308.3**

Choose 6 **credit units** from the following:

- **ACB 330.3**
- **CPPS 337.3** (Experimental Design and the Health Care System)
- **NEUR 350.3** (Fundamental Neuroscience)
- **PHPY 301.3**

Choose 6 **credit units** from the following:

- **ACB 400.3**
- **ACB 405.3**
- ACB 406.3
- NEUR 404.3 (Advances in Neurophysiology and Neuropharmacology)
- PHPY 401.3
- PHPY 403.3
- PHPY 405.3

C5 Electives Requirement (21 credit units)

Arts and Science courses, or those from other Colleges that have been approved for Arts and Science credit, to complete the requirements for 120 credit unit Four-year program, of which at least 66 must be at the 200-level or higher.

- HLST 210.3 is recommended.
Course changes:

CPPS 337.3 replaces PHPY 402.3:

**CPPS 337.3: Experimental Design and the Health Care System**

This course emphasizes the application of the scientific process as it applies to basic science and clinical research, within the context of the Canadian health care system. Students will be exposed to basic principles of experimental design, principles of critical appraisal and evidence-based medicine, and the basic structure of the Canadian health care system, including regulations governing drug discovery and evaluation.

**Weekly hours:** 3 Lecture hours  
**Prerequisite(s):** PHSI 208.6; or BMSC 207.3 and BMSC 208.3.

PHPY 402.3: Therapeutics Herbal Compounds and Evidence Based Medicine

Using case studies, this course provides an introduction to evidence based practices in the Health Sciences. The types and components of clinical studies and related issues of scientific validity, reliability and safety are discussed in relation to the development and use of drugs and herbal compounds.

**Weekly hours:** 3 Lecture hours  
**Prerequisite(s):** PHPY 304.3 and 305.3, or permission of the Instructor.

CPPS 405.3 and NEUR 405.3 replace ACB 405.3:

**CPPS 405.3: Current Topics in Cellular Physiological and Pharmacological Sciences**

Leading edge and state-of-the-art research will be examined in a seminar-discussion format where students will present and assess selected publications from the current scientific literature on a variety of topics related to Cell Biology, Physiology, and Pharmacology.

**Weekly hours:** 1 Lecture hours and 2 Seminar/Discussion hours  
**Prerequisite(s):** 9 credit units from ACB 325, PHPY 302, PHPY 303, PHPY 304 or PHPY 405.

**NEUR 405.3: Current Topics in Neuroscience**

Leading edge and state-of-the-art research will be examined in a seminar-discussion format where students will present and assess selected publications from the current scientific literature on a variety of topics related to Neuroscience.

**Weekly hours:** 3 Seminar hours  
**Prerequisite(s):** 9 cu from ACB 325, ACB 334, PHPY 301, HSC 350 or PSY 242.

**ACB 405.3: Current Topics in Cell Biology**

Recent developments and the state of the art of cell biology research will be examined in a seminar-discussion format. Students will present and evaluate selected publications from the current literature on a variety of topics related to cell biology.
Weekly hours: 1 Lecture hours and 2 Seminar/Discussion hours  
Prerequisite(s): ACB 325.3 and 330.3.

CPPS 432.6 and NEUR 432.6 replace ACB 401.6 and PHPY 432.6:

CPPS 432.6: Undergraduate Research Project in Cellular Physiological and Pharmacological Sciences

A course in which fourth-year students undertake an experimental research project in a selected area of cell biology, physiology, or pharmacology. The student research projects are directly supervised by a faculty member from the Department of Anatomy, Physiology, and Physiology. Students acquire hands-on experience in modern experimental techniques and approaches in the specific topic area of their project. Course evaluation is based on oral and poster presentations, a written research report, student effort, and laboratory performance. CPPS 432 is requirement for all students in the Honours CPPS degree program. However, non-honours CPPS students may request approval for CPPS 432 provided they have found a faculty member willing to supervise their research project.

Weekly hours: 3 Lecture hours and 8 Research hours  
Permission of the department required.

NEUR 432.6: Undergraduate Research Project in Neuroscience

A course in which fourth-year students undertake an experimental research project in a selected area of the neurosciences. The student research projects are directly supervised by a faculty member from the Department of Anatomy, Physiology, and Physiology. Students acquire hands-on experience in modern experimental techniques and approaches in the specific topic area of their project. Course evaluation is based on oral and poster presentations, a written research report, student effort, and laboratory performance. NEUR 432 is requirement for all students in the Honours NEUR degree program. However, non-honours NEUR students may request approval for NEUR 432 provided they have found a faculty member willing to supervise their research project.

Weekly hours: 3 Lecture hours and 8 Research hours  
Permission of the department required.

ACB 401.6: Undergraduate Research Project

A course in which fourth-year students undertake an experimental research project under the direct supervision of an ACB faculty member. Students acquire hands-on experience in modern experimental techniques and approaches in the cellular and anatomical sciences. Course evaluation is based on oral and poster presentations, a written research report, and student initiative. This course is strongly recommended for students in the Honours Anatomy and Cell Biology program, and is optional for students in the 4-year ACB degree program.

Weekly hours: 6 Practicum/Lab hours  
Permission of the department required.

PHPY 432.6: Research Project in Physiology and Pharmacology

Advanced work in a selected area of physiology and pharmacology. This normally consists of a laboratory research project done under the direct supervision of a Faculty Advisor.
Weekly hours: 10 Practicum/Lab hours
Formerly: PHSI 432.6
Prerequisite(s): PHPY 308.3, or permission of the instructor.
Note: Students with credit for PHSI 432.6 cannot take this course for credit.

ACB 334.3 (Introductory Neuroanatomy), HSC 350.3 (Fundamental Neuroscience), PHPY 301.3 (Fundamental Neuroscience Intercellular Communication), and PHPY 404.3 (Advances in Neurophysiology and Neuropharmacology) are each to be relabelled to the NEUR subject code.
Thank you for the opportunity to review and provide feedback on the proposed undergraduate B.Sc. in Neuroscience program. Most importantly, we support the strategy to reach out to the College of Kinesiology, as we support and are excited about the development of a formalized undergraduate neuroscience program at Usask and look forward to future collaborations. In terms of the specific proposal details:

- We appreciate being part of the consultations, even though relatively late in the process, and feel that it would have been an oversight to not include the College of Kinesiology because of our current strengths in the area.
- We agree there is potential benefit to including three of our courses as electives in the program (KIN 322, Motor Learning and Control; KIN 498: Motor Control of Neurological Conditions; a planned Neuromuscular course) as this could lead to students being interested in Neuroscience from a KIN perspective as it relates to future graduate programming. Further, it relays the message that neuroscience “lives” in KIN.
- We share the concerns voiced by others on campus that the program isn’t broad enough, particularly as it relates to cognitive (Psych) and motor systems (KIN). The program seems heavily weighted towards Biomedical Neuroscience or bench neuroscience, and does not seem to reflect the breadth of neuroscience at Usask. Perhaps it could be broadened in the future.
- Without an intimate knowledge of the all course content, we browsed through a few of the course outlines included in the program proposal (some of the links were dead) and wonder about the total amount of motor systems neuroscience content. For example, NEUR 350.3 (Fundamental Neuroscience) includes only one lecture on Motor Control.
- The program proposal describes one potential impact of the program as: “…the Neuroscience program utilizes a variety of neuroscience-related courses of Psychology and Biology which will have enrollment benefits, attract attention to their neuroscience courses and faculty, and represent the ideal of different departments and colleges working together towards a common academic goal. It is hoped that this spirit of collaboration will evolve into a cross-campus Graduate Program in Neuroscience.” However, if one potential goal is to develop as cross-campus Graduate Program in Neuroscience, we recommend starting with a broad interdisciplinary approach.
- Ultimately, we support KIN Neuro courses (perhaps using the cross-list NEUR as suggested by others) in the program as electives, but would like to recommend more interdisciplinary programming be adopted. The KIN courses are not officially included as
electives in the current version of the proposal (as we might have been consulted too late in the process for them to be considered). However, if KIN courses can be included, we recommend that edit. If it’s too late, we suggest following up to ensure KIN courses are included in subsequent iterations. Perhaps KIN could have a representative (Alison Oates or Jon Farthing) on any working groups that are evaluating the new program.

Overall, although we are supportive of the program in principle, we feel it could be further strengthened by increased cross-campus consultation and collaboration.

Thank you for your work in putting this proposal together. As mentioned, we are excited by the potential of a neuroscience program and look forward to future collaborations. If you have any questions, please feel free to let us know.

Kent

Kent Kowalski, Ph.D.
Associate Dean Academic
PAC 300.4
College of Kinesiology
P: (306) 966–1079
kinesiology.usask.ca

From: Dahl, Alexis <alexis.dahl@usask.ca>
Sent: Tuesday, August 27, 2019 10:54 AM
To: Kowalski, Kent <kent.kowalski@usask.ca>; challenge.coordinator@artsandscience.usask.ca
Cc: Napper, Scott <scott.napper@usask.ca>; London, Chad <chad.london@usask.ca>; Farthing, Jon <jon.farthing@usask.ca>; Oates, Alison <alison.oates@usask.ca>; Giesbrecht, Dawn <dawn.giesbrecht@usask.ca>
Subject: RE: B.Sc. Neuroscience Program Proposal Feedback

Hi Kent,

Thank you for your feedback on this proposal. As you have indicated that you support the program, in principle, the suggestions which you have submitted will be shared at all levels as part of the approval process, but will not be interpreted to be a “challenge” which requires resolution prior to moving forward.

It is at the discretion of the proposers whether to add one or more of the KIN courses to the program at this time, but should they wish to do so, the change can still be made. (Special Topics courses (X98/X99) cannot be explicitly added to program requirements, but such courses can be considered as exceptions, or added once the course is regularized with a permanent number.)

Please let me know if you have questions!
Kind regards,
Alexis

**Alexis Dahl, B.Ed., B.Sc.**
Director, Programs Office
College of Arts & Science | University of Saskatchewan
P. (306) 966-4247

---

**From:** Dahl, Alexis <alexis.dahl@usask.ca>
**Sent:** Thursday, September 12, 2019 11:15 AM
**To:** Kowalski, Kent <kent.kowalski@usask.ca>
**Cc:** Napper, Scott <scott.napper@usask.ca>; London, Chad <chad.london@usask.ca>; Farthing, Jon <jon.farthing@usask.ca>; Oates, Alison <alison.oates@usask.ca>; Giesbrecht, Dawn <dawn.giesbrecht@usask.ca>
**Subject:** RE: B.Sc. Neuroscience Program Proposal Feedback

Hi Kent,

Please find attached the response to your feedback, from the proposers.

Kind regards,
Alexis

Attachment:

Hi Kent,

We would like to thank you and your faculty for reviewing and providing feedback on our proposed undergraduate major in Neuroscience. We are sorry consultation seemingly occurred so late in the process but initially we were under the impression that the proposed programs would not be submitted until the summer of 2020 and so thought Departmental and College consultations would take place over the 2019-2020 academic year. These programs were expedited because the College of Arts and Science required that all programs change to a new program template for 2020-2021, and rather than overhaul our program requirements two years in a row, it was suggested by the College that we submit our new programs at the same time the new templates would be implemented.

We share your concern regarding the breadth of cognitive neuroscience in the proposed program and have made revisions to address this issue that have been agreed upon by the Department of Psychology. The program has been revised to reflect the following; 6 CU’s of cognitive psychology are required from a list of three possible courses chosen by the Department of Psychology, the Advanced Seminar in Neuroscience (PSY 448) has been made an option to fourth year students in the program and we have listed additional psychology courses as recommended electives in C5 (open electives).

Faculty involved in the proposed Neuroscience program are excited at the possibility of adding courses from your College and increasing the breadth of the program. We thought the
meeting with Dr. Oates went very well and would be happy if Dr. Oates and/or Dr. Farthing would consider consulting further on the program and work with our faculty to include relevant, and accessible, courses from your College. We are highly in favour of increasing the number of upper year Neuroscience courses available, to allow students to focus on neuroscience topics they find most interesting. We anticipate that the program requirements will evolve over time, and look forward to working with you to add these courses for future program years (as early as 2021-22).

We also hope the spirit of collaboration continues on in the form of a graduate program in neuroscience, with branches to additional Colleges not included in the undergraduate proposal, such as the College of Pharmacy and Nutrition, and the Western College of Veterinary Medicine. Faculty in our department are happy to continue collaborations with your and other Colleges interested in this goal.

Thank you again for your input. We will continue to be in contact with Dr. Oates, Dr. Farthing and yourself as we work to improve this proposed program.

Respectfully submitted,

Thomas Fisher, Department Head APP
Scott Napper, BMSC Project Lead

From: Kowalski, Kent <kent.kowalski@usask.ca>
Sent: September 12, 2019 1:06 PM
To: Dahl, Alexis <alexis.dahl@usask.ca>
Cc: Napper, Scott <scott.napper@usask.ca>; London, Chad <chad.london@usask.ca>; Farthing, Jon <jon.farthing@usask.ca>; Oates, Alison <alison.oates@usask.ca>; Giesbrecht, Dawn <dawn.giesbrecht@usask.ca>
Subject: RE: B.Sc. Neuroscience Program Proposal Feedback

Hi Alexis,

Thanks so much for sending this along (and to Thomas and Scott for the response). I fully support continuing to be in contact with Jon Farthing and Alison Oats in particular, as I know they are both excited by the potential for the development of neuroscience on campus and would welcome further collaborations. I’m happy to stay connected as needed as well.

Thanks again.

Kent
Kent,

Thanks for the support and enthusiasm. I think this is going to be an excellent program for students and a wonderful opportunity for cross-campus collaborations.

We look forward to working with Kinesiology on this effort.

Scott

Dr. Scott Napper
Professor, College of Medicine, Department of Biochemistry, Microbiology & Immunology
Senior Research Scientist, Vaccine and Infectious Disease Organization-International Vaccine Research Centre
University of Saskatchewan
(306) 966-1546

Biology

On Aug 30, 2019, at 12:31 PM, Wilson, Ken <ken.wilson@usask.ca> wrote:

Hi Alexis

Below are some comments on the latest course challenge proposal from the BMSC Departments. Sorry for getting this to you after the deadline. I was away from campus and am just getting caught up on the things I missed.

If you have any questions about our comments, please let me know.
I hope you have a great long weekend
Ken

--
Dr. Kenneth Wilson
Head, Department of Biology
University of Saskatchewan
Saskatoon SK S7N 5E2
Canada
Department of Biology comments regarding the August 2019 College Challenge Proposal from the BMSC departments

1. General comments about the new program in Neuroscience:

On behalf of the Department of Biology, I want to thank the proponents of the Neuroscience program for meeting with members of our department to discuss their plans and the reasoning for their approach. We think that the concept of the Neuroscience program has the potential to attract new students to an exciting emerging field of human and animal health/science. I appreciate that the proponents of the program are located in the College of Medicine and hence have a focus on human health, however in my opinion they are missing some excellent opportunities to help students connect human neurobiology to its evolutionary roots. The nervous system has a complex evolutionary history that top neurobiology research exploits to better understand how mammalian brains function. Thus, courses that focus exclusively on human body systems seem overly targeted, especially at the 200-level. There are no courses in diversity or broader-based animal functional biology.

The Department of Biology has several courses where fundamental aspects of neuroscience are taught from a broader perspective. For example, BIOL 317 (focused on the origin, evolution and application of bioelectric phenomena in animals), BIOL 318 (details animal organ system regulation via the nervous and endocrine systems), BIOL 436 (includes parasitic modulation of animal behaviour), and BIOL 472 (animal behaviour) all could possibly find a place within a Neuroscience program. We note that when senior courses from cognate disciplines like Biology (e.g. BIOL 430) are listed in the current program proposal, they are done as a list of elective options. As a result, the chance of a student studying neuroscience from anything other than a human-centered perspective is low.

To facilitate increased inter-/multi-disciplinarity, I would like to see greater flexibility in the program with regards to course prerequisites. Siloing the program using a long list of BMSC courses to limit student access to senior courses does a disservice to the diverse group of students who call the College of Arts and Science home. I think that the program would be strengthened and numbers of students taking the specialized courses would be increased if students majoring in other programs and colleges were able to take some of the courses. To truly hit the UofS targets for interdisciplinary, this program needs to offer greater flexibility for students to sample parts of the program. This could be done easily if the proponents worked with other units offering courses that deal with neuroscience and basic animal functional biology, rather than telling us their plans as a form of consultation immediately prior to submission.

2. The proposed Course BMSC 320 – Nucleic acids to Human Disease currently has prerequisites of BMSC 210 and BMSC 220. Based on the topics outlined in the proposed syllabus we see this as an extension of concepts that are introduced in BIOL 226 - Genes to Genomes, and suggest that BIOL 226 be considered as an alternate prerequisite to BMSC 220. This would actually increase flexibility for students in the new proposed four-year and
honours programs; BIOL 226 is already a C4 requirement or C4 elective in these degrees and this would increase their options for switching programs. This should have no negative impact to the program as described and would open up BMSC 320 to a greater diversity of students. This also would be in keeping with the use of BIOL 226 as an alternate to BMSC 220 in the proposed course BMIS 340 (see below).

We do not see BMSC 320 as being equivalent to BIOL 226.3. BIOL 226.3 includes the concepts of inheritance of genes and alleles and includes population genetics, which provides the fundamental basis for understanding how rare disease alleles persist in human populations. We note that in the 3 year program students may take either BMSC 320.3 or BIOL 226.3 and note the discrepancy in coverage of topics and level of instruction.

3. Proposed Course BMIS 340 Introductory Molecular Biology. We note that BIOL 226.3 is an alternate prerequisite with BMSC 220 for the BMIS 340 course, but seek clarification. It is listed on the form as BMSC 240.3; BMSC 210.3; and BMSC 220.3 or BIOL 226.3. In the proposed syllabus it is listed as BMSC 240.3, BMSC 210.3, and BMSC 220.3 or BIOL 226.3 (commas instead of semicolons). It is unclear if BIOL 226.3 is meant to be a standalone prerequisite or an alternative to BMSC 220.3. We suspect the latter since “one of BMSC 220.3 or BIOL 226.3” was one of the prerequisites to BIOC 311 proposed for deletion.

4. The note for the proposed split course BMSC 207 and 208 rolls over (more or less) a description of the current relationship between BIOL 224 and PHSI 208.6. The Department of Biology has not been consulted about these notes or asked for our opinion on the “for credit” relationship between the three half courses. Extensive consultation occurred at the time the notes were originally added to the BIOL 224.3 and PHSI 208.6 course descriptions. These consultations included the various departments plus representatives from the College undergraduate advising office.

The Department of Biology is of the opinion that the split of PHSI 208 into two half courses provides an opportunity to revisit the notes in the various courses. We suggest that consultation take place on this issue that includes the undergraduate advising office. For example, it might be possible to allow credit for both BIOL 224 and the proposed BMSC 207 course (while retaining the proposed note in BMSC 208). We suspect something like this might increase student flexibility and create a situation where it is easier to advise students. The Department of Biology will also need to consult with some other Colleges about their views on the note in BIOL 224.

On 8/30/2019 2:29 PM, Dahl, Alexis wrote:

Hi Ken,

I will pass these comments on to the proposers. So that I am clear on how to proceed, can you please clarify whether these comments are “suggestions”, or constitute a “challenge” to the proposed Neuroscience program. If the first, the proposers will be asked to consider them, but will not be required to communicate with you or make any changes. If the second, the proposers will need to communicate with you to seek a resolution, and if none can be reached, the APC (BSc) will consider the challenge, determine its merit, and decide whether changes are necessary.
Thanks,
Alexis
Sent from my iPad

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**From:** Wilson, Ken <ken.wilson@usask.ca>  
**Sent:** Friday, August 30, 2019 3:58 PM  
**To:** Dahl, Alexis <alexis.dahl@usask.ca>  
**Cc:** Marchant, Tracy <tracy.marchant@usask.ca>  
**Subject:** Re: Comments on the Neuroscience Program Proposal from Biology

Hi Alexis

I would like these to be considered challenges.

Thanks for checking
Ken

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**From:** Dahl, Alexis  
**Sent:** Thursday, September 12, 2019 11:20 AM  
**To:** Wilson, Ken <ken.wilson@usask.ca>; Marchant, Tracy <tracy.marchant@usask.ca>  
**Subject:** RE: Comments on the Neuroscience Program Proposal from Biology

Hi Ken,

Attached please find the response from the proposers. Please let me know as soon as possible if this response resolves your challenge, and if not, which issue(s) are still outstanding.

Kind regards,
Alexis

Attachment:

Hello Ken,

We would like to thank you and your faculty for reviewing and providing feedback on our proposed undergraduate program in Neuroscience. We are sorry that our consultation with you occurred so late in the process but we were initially under the impression that the proposed programs would not be submitted until the summer of 2020 and so thought Departmental and College consultations would take place over the 2019-2020 academic year. These programs were expedited because as you know the College of Arts and Science required all departments to change their current programs from a C1-C7
program template to a C1-C5 program template and rather than overhaul our program
requirements two years in a row, it was suggested by the College that we submit our
new programs at the same time the new template would be implemented.

We will address each of your concerns in the order which they were stated.

Comment 1: The neuroscience major we have proposed is built on the existing BMSC
platform. A key component of this platform is the six credit units of physiology that is
required of all BMSC students and is necessary for students to succeed in our 300-level
courses. At the request of the University the former single six credit unit course (PHSI
208.6) is being split into two three credit unit courses (BMSC 207.3 and BMSC 208.3)
and both courses will be required for all BMSC students. In the context of our
neuroscience major, BMSC 207.3 is particularly important because it begins with
approximately 16 hours of core neuroscience content (membrane dynamics, cellular
electrophysiology, nervous system structure and function) and nervous system control of
organ system functioning is a central theme in the remainder of BMSC 207.3 and in
(BMSC 208.3). We feel that the 16 hours of nervous system content covered in BMSC
207.3 is absolutely necessary for students to succeed in our subsequent neuroscience
courses (PHPY 301, HSC 350 and ACB 334).

Although our department is located within the College of Medicine and our programs do
have a human focus, we agree that it would be very difficult to teach neuroscience
without discussing its evolutionary roots and including relevant research from vertebrate
and invertebrate models. Many courses within our proposed program (PHPY 301, HSC
350, PHPY 404) include historical findings as well as recent discoveries in a variety of
animals including giant squid, mollusks, zebra fish, flies, rodents and primates.

Regarding the inclusion of additional Biology courses into the proposed Neuroscience
program our thoughts are as follows:

BIOL 317 - Fundamentals of Animal Physiology: Our students will take more than 50
hours of cellular neuroscience in BMSC 207.3 and PHPY 301 and 38 hours of systems
neuroscience in HSC 350 therefore we do not think our students will be exposed to new
content by taking BIOL 317. We asked four faculty members involved in our current
neuroscience courses to independently review the syllabus for BIOL 317 and all agreed
that while this course does contain fundamental aspects of neuroscience, all of these
topics are covered in PHSI 208.6, PHPY 302.3 and PHPY 303.3, with the latter two courses existing as potential electives
for our students.

BIOL 318 - Comparative Animal Physiology and BIOL 436 - Animal Parasitology: The
syllabi of these courses make no mention of the nervous system and while nervous
system control of organ systems is important, it covered extensively in PHSI 208.6,
PHPY 302.3 and PHPY 303.3, with the latter two courses existing as potential electives
for our students.

BIOL 472 - Animal Behaviour: We would be interested in further discussion regarding
but currently it has extensive prerequisite requirements that our students would not be
able meet. BIOL 472 requires BIOL 228 and 6 additional CU’s of senior Biology.
Including these 9 prerequisite courses into our current program is simply not feasible.
In the proposed program, we give students the option to choose from a list of neuroscience courses including PHPY 404.3 Advances in Neurophysiology and Neuropharmacology, PSY 448.3 Advanced Seminar in Neuroscience and BIOL 430.3 Neurobiology of Behaviour. Two courses from the College of Kinesiology will also likely be added to this list in future program challenges. Offering all of these courses as options adds breadth to the program and give students the opportunity to choose and focus on an area of neuroscience that interests them. Students will not be advised to take a particular course, it will be left entirely up to them.

We agree that we should strive to facilitate students in other programs to enroll in our courses. We will therefore change the prerequisite requirements for PHPY 301 and HSC 350 to read as follows: “BMSC 207.3 OR BIOL 317.3”. This will open these courses up to Biology students to be taken as electives. To further increase courses available to Biology students we will also expand the prerequisite requirements for PHPY 302 and PHPY 303 to read “BMSC 207.3 and BMSC 208.3 OR BIOL 317.3 and BIOL 318.3”. These changes will open PHPY 301, PHPY 302, PHPY 303 and HSC 350 to your students in addition to PHPY 304 which currently accepts BIOL 224 as a prerequisite.

Comment 2 - regarding the concern that the prerequisite requirements for BMIS 320 are overly restrictive, prohibiting students from outside the biomedical science disciplines from taking this class: The suggestion is offered that BIOL226 should be allowed as an alternate to the current prerequisite of BMSC 220. This is an excellent suggestion. We are confident that BIOL 226 would be equivalent preparation as BMSC 220 for BMIS 320. This change in prerequisite requirements is expected to increase accessibility, enrollment, and academic diversify of the class.

Comment 3 - request for clarification of the prerequisite requirements for BMIS 340, specifically whether BIOL226 is an acceptable prerequisite alternative for BMSC220: Yes, for entry into BMIS 340 a student would require both BMSC210 and BMSC240 as well as either BMSC220 or BIOL226. Similar to our response to comment 2, our desire is to provide the greatest flexibility possible for entry into the class.

Comment 4: As mentioned above PHSI 208.6 is being split to BMSC 207.3 and BMSC 208.3 to meet University recommendations regarding the new registration system. We did not consider changing the current note, because the course content in BMSC 207.3 and 208.3 will be essentially unchanged from that in PHSI 208.6 and our students will need both to enter and succeed in our third-year courses. We would however be open to changing the note to allow Biology students to take BMSC 207.3 and BIOL 224.3 concurrently, if Biology would like this change to occur. This would allow biology students to take BMSC 207 in their second year, enabling them to take PHPY 301 and/or HSC 350 in their third year. We would be happy to discuss this possibility further.

Respectfully submitted,

Thomas Fisher, Department Head APP
Scott Napper, BMSC Project Lead
From Biology: regarding response received to our challenge of August 2019 program and course proposals:

Dear Members of the Academic Program Committee for the College of Arts and Science:

We want to thank Drs. Fisher and Napper for positively considering the changes/clarification we suggested to the various course prerequisites under Comments 2 and 3. We believe this will ensure student access to the proposed BMIS 320 and 340 courses. Changes to the Note for the proposed BMSC 207 and 208, and BIOL 224 are needed but we continue to suggest that this be made in consultation with the Undergraduate Advising Office Staff who deal with students directly affected by these notes. Does the proposed change solve any problems currently seen by the undergraduate advisors? Input on this question would be useful.

Our initial challenge to the Neuroscience Program Proposal put forward by Dr. Napper’s Team was largely concerned with its narrow focus. The proposal write up spoke to the UofS Plan 2025 and the goals of greater interdisciplinarity and collaboration. Yet, the proposal and the reply to our concerns make it clear that the goal is to develop a BMSC program that will funnel students from the common 2-year program into a Neuroscience Degree. Despite combining three small and very similar departments into one unit, this does not make for an interdisciplinary approach. The proposed program does not clearly differentiate itself from the other BMSC programs, simply by changing the title. While the proponents of the program are housed in the College of Medicine, they should be aware of the College of Arts and Sciences Plan where we espouse the strength that is inherent in developing programs that span departmental and disciplinary boundaries. There is no intention evident from the proposal, nor the response to our challenge, to develop an interdisciplinary program. If there was, it would have been developed with the involvement of faculty from the Colleges of Arts and Science, Veterinary Medicine, Agriculture and Bioresources, Kinesiology, and Pharmacy and Nutrition. There are many examples of Neuroscience Programs in Canada. Two excellent ones are at the University of Toronto and Dalhousie University. Both have very broad, and truly interdisciplinary themes. The Neuroscience program outlined here is one dimensional in comparison.

In the response from Drs. Fisher and Napper to our challenge regarding the neuroscience proposal, the same type of approach was taken. Rather than contact us to
work on a common way forward in a collegial manner, they took the simplistic linear approach of rebutting our comments and attempting to dismiss them out of hand. We may have struggled to form an effective compromise, however no attempt was made. We were looking for a mechanism by which students enrolled in a BIOL program could enroll in various senior PHPY and HSC 350 courses. Instead, the proposed changes decrease the chances that a BIOL student could do so. The suggested prerequisite change for HSC 350 is highly problematic. Currently, the prerequisites are listed in the course catalogue as “BIOL 224.3 or PHSI 208.6, or permission of the instructor.” The changes suggested in the letter from Drs. Fisher and Napper would increase the prerequisite requirement to “BMSC 207.3 OR BIOL 317.3”. Biology students would in fact need to take 6 cu of BIOL courses to meet these new proposed prerequisites, whereas students from the BMSC streams would need only a 3 cu prerequisite. We all believe that our own courses are the best and uniquely qualify our students to move into specialized upper-year, discipline-specific courses taught in our units. This should not be the objective of an interdisciplinary program.

Returning to our challenge regarding the original neuroscience proposal, Drs. Fisher and Napper get caught in a paradox. They suggest reasons why various BIOL courses are not suitable for inclusion in the Neuroscience program and exclude students via prerequisites, but then explain that allowing both PHPY and BIOL courses to be taken for credit in the program would be redundant. For example, in writing about BIOL 317, Drs. Fisher and Napper conclude that “To avoid redundancy in the program all faculty suggested that this course not be included.” In writing about BIOL 318, it was noted that “nervous system control of organ systems is important, it is covered extensively in PHSI 208.6, PHPY 302.3 and PHPY 303.3.” In the opinion of the Department of Biology, responses such as this reinforce the point that there are courses from other disciplines from which a pathway through to an interdisciplinary Neuroscience Program can be built.

The Department of Biology continues to see the proposed program as narrowly constructed and reflective of the siloed approach to program delivery that we are moving away from at USask. This is unnecessary given the range of neuroscience expertise available on the USask campus. We request that the Academic Programs Committee place the current Neuroscience Program proposal on hold until a serious effort is made to develop a true inter-/multi-disciplinary Neuroscience Program proposal. A program of which the College of Arts and Science and indeed the University of Saskatchewan can be proud to offer.

Sincerely,

Kenneth Wilson
Head, Department of Biology

See final response from Thom Fisher at the end of the consultation.
Psychology

From: Prime, Steven <steve.prime@usask.ca>
Sent: Monday, August 26, 2019 8:20 AM
To: challenge.coordinator@artsandscience.usask.ca
Cc: Borowsky, Ron <ron.borowsky@usask.ca>; Mickleborough, Marla <marla.mick@usask.ca>; Loehr, Janeen <janeen.loehr@usask.ca>; Elias, Lorin <lorin.elias@usask.ca>
Subject: challenge to proposed Neuroscience program

Dear Academic Programs Committee

I am emailing as the Cognition and Neuroscience Graduate Program coordinator on behalf of our neuroscience faculty in the Department of Psychology (cc’ed on this email). We respectfully submit a challenge regarding the proposed new Neuroscience program offered by the Department of Anatomy, Physiology, and Pharmacology.

Our principal concern is that the proposed neuroscience program is focused primarily on biomedical neuroscience and does not provide an appropriate amount of exposure to other areas of neuroscience - specifically, cognitive neuroscience and neuropsychology, as would be expected in all major Canadian Neuroscience programs (e.g., see University of Calgary for one example, and we would encourage the proponents to take a look at the other U15 Neuroscience programs as well).

As part of the proposed credit requirements, the proposal states that students are required to take PSY 120.3 and they may choose three credits from a list of three 3-credit Psychology courses (i.e., 242.3, 246.3, 252.3). In the four-year BSc (non-honours program), that list includes NEUR 432.6 (research project). Conceivably, students might only take one Psychology course (the required 120.3). We do not believe that PSY120.3 alone would provide students with sufficient exposure to cognitive neuroscience and neuropsychology. As discussed with the proponents at a previous meeting, we recommend that students be required to choose two of the 3-credit 200-level Psychology courses listed as well as keep the recommendation to take PSY 448 (Advanced Seminar in Neuroscience). We believe students would benefit with an appropriate amount of in depth exposure to the neuroscience we do in Psychology.

Given our previous discussion with the biomedical sciences, we believe these suggestions are feasible revisions for the Neuroscience program. We suggest that if the proponents are unable or unwilling to make these changes (i.e., require PSY 120 and at least two of 242, 246, 252), then we do not think it would be appropriate to refer to this program as a "Neuroscience" degree program (and particularly so if other cognate units also feel that sufficient neuroscience breadth is lacking), but could be referred to as something more specific such as a "Biomedical Neuroscience" degree program.

Respectfully submitted

Steve Prime

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Dr Steve Prime
Department of Psychology
Hi Steven,

I have received this challenge and will share it with the proposers, with encouragement to contact you (and the group cc'd) to reach a resolution together. If that is not possible, the committee will consider the challenge, and determine whether changes to the proposal are required, and if so, what changes are required.

Kind regards,
Alexis
Hi Steven,

Attached please find the response from the proposers. Please let me know if this response resolves your challenge, and if not, what issue(s) are still outstanding.

Kind regards,
Alexis

P.S. The program requirements in the form have yet to be updated with the changes, but this will be done before the committee considers the program for approval.

Attachment:

Hello Steve,

Thank you for reviewing our proposed undergraduate major in Neuroscience. We agree that 6 CU of PSY courses is required, and our intent had been to include 6 CU. This was a typo/error in the transfer of the courses from the spreadsheet into the course submission. In fact, we should have caught this error since the total CU did not add up in the submission.

Regarding the inclusion of the NEUR 432.6 research project as part of the list of three 3-credit Psychology courses in the four-year BSc: We agree to remove NEUR 432.6 from the list so that students will have the choice of 3-credit units from PSY 242.3, 246.3 and 252.3.

Thank you again for your input.

Respectfully submitted,

Thomas Fisher, Department Head APP
Scott Napper, BMSC Project Lead

From: Prime, Steven <steve.prime@usask.ca>
Sent: Thursday, September 12, 2019 11:22 AM
To: Dahl, Alexis <alexis.dahl@usask.ca>
Cc: Borowsky, Ron <ron.borowsky@usask.ca>; Mickleborough, Marla <marla.mick@usask.ca>; Loehr, Janeen <janeen.loehr@usask.ca>; Elias, Lorin <lorin.elias@usask.ca>
Subject: Re: challenge to proposed Neuroscience program

Thank you Alexis

We will review it and respond to you as soon as possible.

Best
Steve
Hi Dawn, Scott and Thom,

Psychology has considered your response to their challenge to the Neuroscience program proposal, and Dr. Steven Prime has returned the following response on their behalf:

We thank the proponents very much for making the recommended changes in response to our challenge (i.e., 6 credit units from PSY 242.3, 246.3, and 252.3 while removing NEUR 432.6). We are very grateful that students would be sure to acquire a greater breadth in their neuroscience training by taking these Psychology courses. We would also like to re-emphasize another point in our challenge which is that we believe any neuroscience program should provide an appropriate amount of breadth to truly represent the interdisciplinary nature of neuroscience. The proponents must address the need for interdisciplinarity and breadth in a U15 Neuroscience program and should accept the recommendations from other cognate units (e.g., Biology and Kinesiology). As we stated in our challenge, if the proponents are not willing or able to implement such recommendations for interdisciplinarity and breadth, we cannot support calling this program “Neuroscience”, and the proponents could refer to the proposed program as “Biomedical Neuroscience”.

The Academic Programs Committee (BSc) meets on Tuesday afternoon, and will see the record of challenge/responses. If you have a response to add to this, please send it by Monday at 4:00pm.

Thanks,

Alexis

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Final response from Thom Fisher to Biology and Psychology

We thank the Biology Department and the Psychology Department for their responses and welcome the opportunity to respond and to explain in greater detail the intention of our proposal.

Please let us begin with a bit of context. There are currently four undergraduate BSc programs offered by the Biomedical Science departments, which aligned with the five biomedical science departments that existed within the College of Medicine prior to their July 1, 2018 merger into two departments. Our four BSc programs share a common platform of Year 1/2 coursework
that was designed to provide our students a broad introduction to the biomedical sciences and to enable them to make an informed choice as to which disciplinary major to pursue as they enter their third year of studies. Our two new departments *(Anatomy, Physiology, and Pharmacology and Biochemistry, Microbiology, and Immunology)* are proposing changes to the BSc programs that we offer. The new majors will retain our Common Year 1/2 platform. The BMI department’s plan is to combine their existing two majors into one, and the APP department’s proposal is to replace our existing ACB and PHPY BSc majors with two new majors – one in *Cellular, Physiological, and Pharmacological Sciences (CPPS)* and the other in *Neuroscience (NEUR)*. Neuroscience is a particular strength of the Department of APP. We have about a dozen faculty members who are trained in neuroscience and most of them continue to do neuroscience-related research. Our existing PHPY and ACB majors already contained a number of neuroscience-related courses and there is a willingness among our faculty to create new neuroscience courses. We therefore saw our departmental merger as providing us an opportunity to offer a Neuroscience BSc major under the umbrella of the biomedical sciences. We are not, however, interested in creating a “Neuroscience program” that would be separate from the other BMSC majors and would differ from them in its first two years of coursework.

We do not wish to create any confusion in prospective students about the disciplinary scope and focus of our program. We would therefore be pleased to change the name of our proposed major to “Biomedical Neuroscience”, as has been suggested by the Department of Psychology.

We also do not have any wish or intention of monopolizing use of the term “neuroscience”. If any other department in future decides to incorporate that title in one of their own undergraduate programs, we would be more than happy to cooperate with them. If, for example, the Department of Psychology wants to create a major in “Cognitive Neuroscience” or something similar, we would be happy to work with them to enable both their students and ours to benefit from courses in both programs.

We are also more than happy to allow our students to take relevant courses from other departments and to have their students take courses from our program. We can only do this, however, when the students are prepared properly to take the courses and we will continue to be constrained by the courses that our students take in their first two years. Regarding the Department of Biology’s concern about access to HSC 350, we note that there were 13 Biology students who took HSC 350 in the last three years and their course average (65 %) was about 10 % lower than the class average over those three years. If Biology wishes to maintain the current situation (which allows students to take HSC 350 with only BIOL 224 as a prerequisite) we would be willing to do so, but are concerned that this may not be in the best interests of their students and wish to ask if they agree.

We are excited about our proposed new majors and look forward to working with other departments and colleges to create the best possible experience for students. We are confident that creation of these new majors is going to be of great benefit to the students and to the University.
Cellular, Physiological, and Pharmacological Sciences

No correspondence specific to this program was received. Please see general information.
PROPOSAL IDENTIFICATION

Title of proposal: Major in Biochemistry, Microbiology, and Immunology to replace existing majors in Biochemistry and Microbiology and Immunology

Degree(s): Bachelor of Science
Field(s) of Specialization: Biochemistry, Microbiology, and Immunology
Level(s) of Concentration: Honours and Four-year
Degree College: Arts & Science

Contact person(s) (name, telephone, fax, e-mail):

Dr. Scott Napper
Faculty; Department of Biochemistry, Microbiology, and Immunology; College of Medicine
Scientist and Science Management; Vaccine and Infectious Disease Organization-International Vaccine Research Center
University of Saskatchewan
Tel: (306) 966-1546; e-mail: scott.napper@usask.ca

Dr. Bill Roesler
Department Head; Biochemistry, Microbiology, and Immunology
College of Medicine
University of Saskatchewan
Tel: (306) 966-4375; e-mail: bill.roesler@usask.ca

Proposed date of implementation: May 2020
Executive Summary: The Departments of Biochemistry and Microbiology & Immunology merged in 2018 to form the Department of Biochemistry, Microbiology, and Immunology (BMI). The merged departmental structure offers numerous advantages including greater faculty numbers to ensure a more robust department, enhanced teaching and research synergies, and establishment of a stronger foundation for multi-disciplinary training. Having successfully navigated the merger process, the BMI Department now seeks to unite the two predecessor undergraduate programs into a single Biochemistry, Microbiology, and Immunology major. Within this new major there is enhanced priority on multi-disciplinary training, critical thinking, and experiential learning with the goal to inspire and enable careers within a spectrum of science-based activities as well as providing an educational foundation for entry in health-related professional colleges.

Rationale for Program Change:

The biomedical sciences are highly-competitive, rapidly-evolving disciplines, and as such, it is essential to ensure that training in these fields reflects contemporary content and priorities. This trend towards multi-disciplinary teaching and research is particularly evident within the fields of Biochemistry, Microbiology, and Immunology. With many common foundations, priorities, and investigative tools, these fields of study are exceptionally well-suited to co-exist within a shared department and teaching/research program. With that, in July 2018, through an overwhelmingly positive vote by our faculty, the Departments of Biochemistry and Microbiology & Immunology merged to form the Department of Biochemistry, Microbiology, and Immunology (BMI). The merged departmental structure offers numerous advantages including greater faculty numbers to ensure a more robust department, enhanced teaching and research synergies, and establishment of a stronger foundation for multi-disciplinary training. Having successfully navigated the merger process, the BMI Department now seeks to unite their undergraduate programs into a single Biochemistry, Microbiology, and Immunology major.

The proposed program change formalizes the will of the faculty, matches current priorities within biomedical science education, leverages the unique infrastructure and expertise present at the U of S, and exemplifies the priorities of the University in the establishment of multi-disciplinary collaborations. The new major enables the success of our graduates and promotes growth of biomedical research at the U of S.

Overall Objectives of the BMI Major:

- Provide learners with student-centric, multidisciplinary training.
- Inspire and enable careers within a spectrum of science-based activities.
- Develop skills that will serve them well in the workplace, namely critical thinking skills, communication (written and oral), collaboration and teamwork.
- Provide a strong foundational basis in biomedical sciences and research skills as well as serve as an inspiration for those students considering graduate training.
- Provide students with experiential learning opportunities.
- Reflect modern priorities in biomedical science education.
- Attract top-tier students, both nationally and internationally.
- Bolster the research capacities of our faculty.
- Enable enrollment growth for the U of S.

Key Curriculum Changes for the BMI Major:

The proposed BMI major builds on the strengths of its predecessors but with increased priority on multi-disciplinary training, experiential learning, and cutting-edge content. Following completion of the BMSC Platform, the priority transitions to more specific, yet still multidisciplinary, training within the areas of
Biochemistry, Microbiology and Immunology in the third and fourth years. Within this, there is sufficient flexibility within the discipline-specific electives to allow students to tailor their education to any of the three sub-disciplines (Microbiology, Biochemistry or Immunology) of the program.

In terms of updated curriculum, a number of courses are merged to remove redundancies:
- BIOC 300.3 Information Transfer DNA to Proteins and MCIM 326.3 Introductory Prokaryotic Genetics and Physiology will be combined to form BMIS 320.3 Nucleic Acids – From Central Dogma to Human Disease.
- BIOC 311.3 Introductory Molecular Biology and MCIM 391.3 Experimental Molecular Microbiology will be combined to form BMIS 340.3 Introduction to Experimental Molecular Biology.
- MCIM 308.3 Medical Bacteriology and MCIM 309.3 Medical Virology will be combined to form BMIS 308.3 Introduction to Pathogens.

BMI will include a new experiential learning opportunity in the form of BMIS 380.3 Team Based Experimental Microbiology (offered as MCIM 398.3 in 2018-19 and 2019-20). Course-based undergraduate research experience (CURE) offerings provide students with an authentic research experience in which they have the opportunity to develop and test their own research hypotheses.

Consistent with the majors being replaced, students within the BMI major will have the option for an Honours degree based upon completion of six additional credit units in the major, enrollment in the BMIS 490.0 seminar, and achievement of the required averages in the major and overall. Notably, students will have the option to fulfill the additional six credit unit requirement within the Major Requirement through completion of a BMIS 489.6 research project within the lab of a faculty member.

The current Double Honours degrees in Biochemistry & Biology and Biochemistry & Physics will continue to be offered to students.

Student Demand for BMI Degree:

Over the past 5 years the Biochemistry and the Microbiology and Immunology programs have graduated an average of 26 and 14 students per year, respectively. The new BMI Program is anticipated to build on the sum of these programs. Evidence in support of student demand for multi-disciplinary training within the fields of Biochemistry, Microbiology and Immunology is the fact that among students currently seeking Double Honours degrees in the biomedical sciences, Biochemistry with Microbiology and Immunology is quite popular. Based on this and with the improvements to the curriculum, a moderate increase in student enrollment in BMI beyond the current sums of the individual Biochemistry and Microbiology & Immunology programs is anticipated. There is ample capacity to accommodate this growth.

Targeted Demographics of the BMI major:

The biomedical sciences typically attract highly-motivated students who are either pursuing careers in science or are seeking entry into professional schools (typically Medicine, Pharmacy, or Dentistry). We anticipate a similar foundation of students within the BMI major.

Comparable Programs at the U of S:

The other proposed biomedical science majors – Biomedical Neuroscience and Cellular, Physiological and Pharmacological Sciences – will be the closest equivalent offerings at the U of S. While all the biomedical science majors share the BMSC platform, they are quite distinct in their upper year priorities. In particular, with a heavy emphasis on understanding life a molecular level, the BMI major will be quite distinct from either of the other proposed majors.
Outside the biomedical sciences, the Bachelor of Arts and Science program in Health Studies is likely the closest competing program at the U of S. Similar to some of the BMI students, many students of the Health Studies program aspire to enter medical school. There is some course overlap, especially with the Biology, Development and Health stream, but the programs are, however, quite distinct in their upper year requirements. The BMI major places heavy emphasis on biomedical (natural) science courses. In contrast, the Health Studies program strives for a more holistic perspective with a much broader interdisciplinary scope. Indeed, the Health Studies program is self-described as “a distinct interdisciplinary undergraduate program that builds on and combines science, social sciences, and humanities/fine arts.” The expanded scope of the Health Studies program, relative to the BMI, is achieved through shared priority for courses in the humanities and social sciences, and the sciences. As such, Health Studies and BMI represent quite unique educational experience largely catering to distinct populations of students.

**Comparable Programs in Saskatchewan:**

There are no other comparable programs within Saskatchewan. The closest in-province alternative is at the University of Regina, which offers degrees in biology as well as chemistry/biochemistry. In terms of the number of available courses, faculty numbers, research activity, representation of the various biomedical sciences, and available science-based infrastructure, the offerings at the University of Regina are not equivalent with the current BMSC majors, nor the proposed BMI major.

**Comparable Programs in Canada:**

Most Canadian Universities, in particular those with medical schools, offer degrees within the various biomedical sciences. Further, many Canadian Universities have moved towards a multidisciplinary approach to biomedical science education. Updated programs, like BMI, are essential for us to compete with these schools, both for retention of local students as well as to attract students on national and international scales. In particular, there is the opportunity to differentiate our program from those across Canada and around the world by virtue of the existing infrastructure strengths, including the Canadian Light Source (CLS), the new Health Sciences building, and the Vaccine and Infectious Disease Organization-International Vaccine Centre (VIDO-InterVac). The last of these shares many priorities with the BMI department, and as a result there are strong linkages between the department and VIDO-InterVac, including faculty members who also serve as Scientists at that facility and have their research labs there, and VIDO-InterVac Scientists who have adjunct appointments with the department. Students benefit from these linkages by being exposed to cutting edge content in vaccinology, and opportunities to do Honours Projects, Summer Research projects, and, later, Graduate Studies within one of the premier research facilities within North America. The BMI Department also has strong ties to the CLS, with department faculty who are regular users of that facility, in particular for protein x-ray crystallography. This allows our students opportunities to receive training at the only synchrotron in Canada.

There are two Canadian Universities that have a Department of Biochemistry, Microbiology, & Immunology (BMI). Of these, the University of Victoria offers separate programs in Biochemistry and Microbiology/Immunology, but many of the same courses are required in the two programs. This speaks to the interconnectedness of the two disciplines. The University of Ottawa also has such a department, which offers a degree in biochemistry that can be coupled with a Microbiology/Immunology option, effectively producing an integrated BMI degree similar to what is proposed here.

UBC has separate Microbiology/Immunology and Biochemistry departments which each offer their own program. The University of Calgary offers a Biochemistry program and a Cellular, Molecular and Microbial Biology program, through the department of Biological Sciences. At the University of Alberta, the Biochemistry department offers a program in Biochemistry, while the department of Biological Sciences offers a program in Immunology and Infection as well as two distinct Microbiology programs that focus on
(i) evolutionary history/roles in ecosystems and (ii) bacterial function, structure, and biochemistry. And finally, the Department of Microbiology at the University of Manitoba offers separate degree programs in Microbiology and in Biochemistry.

Looking across the remainder of the U15 Universities, there is shared availability of undergraduate programs relating to different iterations and presentations of Biochemistry, Microbiology, and Immunology. The specific groupings reflect the size and specializations of the particular university with the larger universities, and those with the advantage of greater faculty numbers tending to offer a larger number of specialized options, each with larger complements of supporting courses.

**Potential Impacts on Other Academic Programs:**

The new BMI major is not anticipated to have any negative consequences for other academic programs or units, as the majority of the required courses for the BMI major are carried forward from the previous, separate programs in Biochemistry and Microbiology & Immunology. This includes the introductory and related courses taught by other departments, all of which have been consulted about the proposed updates. The Department of Philosophy has been specifically consulted regarding inclusion of PHIL 140.3 (Critical Thinking), and they have offered their support. The Departments of Psychology and History have been consulted regarding inclusion of HLST 110.3 (Introduction to Health Studies) and HIST 165.3 (History Matters: Health and Society), respectively, as recommended electives in the program, and each has offered support for these selections.

**Alignment with University and College Priorities:**

The BMI major directly aligns with the strategic plans of the university and COM, in particular to strengthen research capacity and to grow a strong cohort of excellent learners/researchers who will enhance both health science professional and graduate programs. The update to the BMSC programs is specifically highlighted in the area of Strengthening Research Capacity in the COM strategic plan. Our goal is to implement undergraduate majors that stimulate graduate student and faculty research programs. In addition, the undergraduate programs will work to encourage and expand collaborations – both interdisciplinary and within college basic science/clinical areas. In particular, we are collaborating with the departments of Community Health and Epidemiology, and Pathology to offer undergraduate courses in Epidemiology and Pathology.

**Knowledge Creation:**

A central priority of the new major is to contribute to a vibrant and robust research environment within the COM. Many of the graduate students within the research labs of the biomedical science faculty are alumni of our own undergraduate programs. As such there is self-serving motivation to ensure these individuals receive the highest caliber of training to best prepare them for success as researchers. While it is relatively easy to train students to be proficient in a range of techniques, the greater value is in equipping these individuals with the skills required to make higher-level contributions to research. The new program, through emphasis on critical thinking, experiential learning, and training in cutting edge research techniques, is designed to enable the training of such individuals. The opportunities provided will also serve as a strong incentive to recruit students (provincially, nationally, and internationally) to our campus.

**Innovation in Academic Programs and Services:**

Within the new major there is a priority for multidisciplinary training that is presented within the context of a revamped curriculum that prioritizes innovative lab experiences in cutting-edge technologies and new opportunities for experiential learning. The new program also brings forth innovative approaches to
academic services through the development of a number of online courses designed to accommodate students from outside of Saskatoon or with limited access to traditional classes. Currently, BMSC 200.3, BMSC 230.3, and PHSI 208.6 (to become BMSC 207.3/208.3 in 2020-21) are available as online courses with further plans to make other courses of the common BMSC Platform available in online formats.

**Resources:**

No additional financial or personnel resources are required to replace the current majors with the unified BMI degree offering.
Program(s) to be deleted: Biochemistry – Bachelor of Science Honours, Double Honours (with ACB and MCIM only), Four-year and Three-year Microbiology and Immunology – Bachelor of Science Honours, Four-year and Three-year

Effective date of termination: May 2020

1. List reasons for termination and describe the background leading to this decision.

The Department of Biochemistry, Microbiology, and Immunology is proposing to replace the Biochemistry, and the Microbiology & Immunology programs with a single program in Biochemistry, Microbiology, and Immunology. The new programs will offer both Honours and Four-year options. A Three-year program in Biomedical Foundations is also proposed, as a replacement for the current Three-year options in each major.

2. Technical information.

2.1 Courses offered in the program and faculty resources required for these courses.

Most of the current courses will continue to be used in the new programs, with some courses being merged to better cover content through a shared Biochemistry/Microbiology/Immunology lens and/or to reflect updated understanding of the subject matter. Seminar and research courses built for the old majors will be replaced by similar courses for the new majors. Faculty teaching requirements will remain virtually unchanged compared to now.

2.2 Other resources (staff, technology, physical resources, etc.) used for this program.

There are no positions or other resources used in these programs that will not be used for the proposed programs.

2.3 Courses to be deleted, if any.

Courses merged:

- BIOC 300.3 (Information Transfer DNA to Proteins) and MCIM 326.3 (Introductory Prokaryotic Genetics and Physiology) to form BMSC 320.3 (Nucleic Acids: From Central Dogma to Human Disease)
• BIOC 311.3 (Introductory Molecular Biology) and MCIM 391.3 (Experimental Molecular Microbiology) to form BMIS 340.3 (Introduction to Experimental Molecular Biology)
• MCIM 308.3 (Medical Bacteriology) and MCIM 309.3 (Medical Virology) to form BMIS 308.3 (Introduction to Pathogens)

2.4 Number of students presently enrolled.

2018-19

Biochemistry: 138
Microbiology & Immunology: 104

2.5 Number of students enrolled and graduated over the last five years.

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<tr>
<td>2019</td>
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</table>

3. Impact of the termination.

3.1 What if any impact will this termination have on undergraduate and graduate students? How will they be advised to complete their programs?

Existing students will be allowed to complete the current program, or they may choose to switch to the new program, per Arts & Science policy.

3.2 What impact will this termination have on faculty and teaching assignments?

None. It is anticipated that faculty and teaching assignments will remain constant.

3.3 Will this termination affect other programs, departments or colleges?

No other departments or colleges will be affected. Students in other majors will still be able to take courses offered.

3.4 If courses are also to be deleted, will these deletions affect any other programs?
No effect on other programs.

3.5 Is it likely, or appropriate, that another department or college will develop a program to replace this one?

Replacement programs are being proposed concurrently.

3.6 Is it likely, or appropriate, that another department or college will develop courses to replace the ones deleted?

N/A

3.7 Describe any impact on research projects.

None.

3.8 Will this deletion affect resource areas such as library resources, physical facilities, and information technology?

No effect. Replacement programs will use the same resources as the old programs.

3.9 Describe the budgetary implications of this deletion.

Most courses remain the same or are replaced by program-focused versions. Changes to the budget should be net zero.

External

3.10 Describe any external impact (e.g. university reputation, accreditation, other institutions, high schools, community organizations, professional bodies).

The replacement of the BIOC and MCIM programs with the new BMI program is anticipated to enhance the university’s reputation, as the new program is anticipated to be at least as popular as the old programs.

It will be important to communicate with external stakeholders, such as high schools and regional colleges, to make potential students aware of the program changes.

3.11 Is it likely or appropriate that another educational institution will offer this program if it is deleted at the University of Saskatchewan?

Replacement programs are being proposed concurrently.

Other

3.12 Are there any other relevant impacts or considerations?

No.
3.13 Please provide any statements or opinions received about this termination.

Please see Consultation.
College Statement

From Gordon DesBrisay, Vice Dean Academic

I am pleased to confirm that the College of Arts and Science supports replacement of the current Bachelor of Science programs in Biochemistry and in Microbiology and Immunology with a single, combined program in Biochemistry, Microbiology, and Immunology.

The College of Arts and Science is working to provide innovative program options that meet student need and demand. The merger of the Department of Biochemistry with the Department of Microbiology and Immunology created the opportunity for these groups of faculty to work together on this new program, which reduces duplication in courses, and therefore makes more efficient use of teaching resources. The new program continues the tradition of offering high-quality education in this area, but provides more course options for students, which will allow graduates more options for future study or employment.

The Academic Programs Committee (BSc) approved the proposals to create the new major and to delete the old majors on September 17, 2019, as did the College Faculty Council on October 10, 2019.
Program Description

Biochemistry, Microbiology, and Immunology

The Department of Biochemistry, Microbiology and Immunology offers a program which provide education in the areas the molecular and cellular approaches to the study of the life sciences including microbial physiology and pathogenesis, protein structure and function, molecular biology, microbial genetics, virology, tumour biology and cancer, immunology and immunopathogenesis. This program includes necessary courses for students prepared to enter graduate studies in biomedical sciences and into health-related professional schools such as Medicine, Dentistry, Veterinary Medicine and Pharmacy. Graduates are also prepared for careers in broad aspects of biotechnology and they can find employment in academic/research institutions and related industries.

Double Honours programs in Biochemistry and Biology, and Biochemistry and Physics are also available. Students considering a Double Honours program must consult an academic advisor within each department.

The four B.Sc. degree programs listed below share a set of courses (the Biomedical Science Common Core) which are to be taken in years 1 & 2. These courses have been incorporated into the C1-C5 requirements.

- Biochemistry, Microbiology & Immunology
- Biomedical Foundations
- Biomedical Neuroscience
- Cellular, Physiological and Pharmacological Sciences

Major Average

The major average in Biochemistry, Microbiology and Immunology programs includes the grades earned in:

- All courses listed in the Major Requirement C4.

Residency Requirements in the Major

To receive a degree in Biochemistry, Microbiology and Immunology, students must complete at least two-thirds of the following coursework (to the nearest highest multiple of 3 credit units) from the University of Saskatchewan.

- Minimum requirements in Major Requirement C4.

See Residency for additional details.
Bachelor of Science Four-year (B.Sc. Four-year) – Biochemistry, Microbiology and Immunology

No more than 6 credit units from one subject may be used in Requirements C1 to C3.

C1 College Requirement (15 credit units)

**English Language Writing**

Choose 6 credit units from the following:
- Approved list

**Indigenous Learning**

Choose 3 credit units from the following:
- Approved list

**Quantitative Reasoning**

Choose 3 credit units from the following:
- MATH 110.3
- MATH 125.3

Choose 3 credit units from the following:
- STAT 245.3
- STAT 246.3
- PLSC 214.3

C2 Breadth Requirement (3 credit units)

Choose 3 credit units from the following areas.
- Fine Arts
- Humanities
- Social Sciences
- Courses with No Program Type

C3 Cognate Requirement (21 credit units)

- BIOL 120.3
- CHEM 112.3
- CHEM 115.3
- PHYS 115.3
- PHYS 117.3 or PHYS 125.3

**Required Cognate Courses**

- PHIL 140.3
Choose **3 credit units** from the following:

- HLST 110.3
- PSY 120.3
- PSY 121.3
- SOC 111.3
- SOC 112.3

**C4 Major Requirement (60 credit units)**

- BMIS 340.3 (Intro to Experimental Molecular Biology)
- BMIS 400.0 (Seminar in Biochemistry Microbiology and Immunology)
- BMSC 200.3
- BMSC 207.3 (Human Body Systems I)
- BMSC 208.3 (Human Body Systems II)
- BMSC 210.3
- BMSC 220.3
- BMSC 230.3
- BMSC 240.3
- BMSC 320.3 (Nucleic Acids from Central Dogma to Human Disease)
- CHEM 250.3

Choose **3 credit units** from the following:

- BIOC 310.3
- MCIM 390.3

Choose **3 credit units** from the following:

- BINF 200.3
- BINF 210.3

Choose **15 credit units** from the following, including at least 9 credit units at the 400-level:

- BIOC 435.3
- BIOC 405.3
- BIOC 412.3
- BIOC 430.3
- BIOC 436.3
- BMIS 380.3 (Team Based Experimental Microbiology)
- BMIS 308.3 (Intro to Microbial Pathogens)
- BMIS 489.6 (Research Project in Biochemistry Microbiology and Immunology)
- MCIM 321.3
- MCIM 417.3
- MCIM 423.3
- MCIM 425.3
- MCIM 487.3

Choose **9 credit units** from the following:

- ACB 325.3
- ACB 333.3
- BINF 300.3
• BIOL 226.3
• BIOL 316.3
• BIOL 331.3
• BIOL 420.3
• BIOL 436.3
• CHEM 456.3
• FABS 325.3
• FABS 334.3
• FABS 430.3
• FABS 450.3
• PHPY 301.3
• PHPY 302.3
• PHPY 303.3
• SLSC 343.3
• Any BMSC, BMIS, BIOC or MCIM course at the 300 or 400 level

C5 Electives Requirement (21 credit units)

Arts and Science courses, or those from other Colleges that have been approved for Arts and Science credit, to complete the requirements for 120 credit unit Four-year program, of which at least 66 must be at the 200-level or higher.

- HLST 210.3 is recommended.

Bachelor of Science Honours (B.Sc. Honours) – Biochemistry, Microbiology and Immunology

No more than 6 credit units from one subject may be used in Requirements C1 to C3.

C1 College Requirement (15 credit units)

English Language Writing

Choose 6 credit units from the following:
- Approved list

Indigenous Learning

Choose 3 credit units from the following:
- Approved list

Quantitative Reasoning

Choose 3 credit units from the following:
- MATH 110.3
- MATH 125.3

Choose 3 credit units from the following:
• STAT 245.3
• STAT 246.3
• PLSC 214.3

C2 Breadth Requirement (3 credit units)

Choose 3 credit units from the following areas.

Fine Arts
Humanities
Social Sciences
Courses with No Program Type

C3 Cognate Requirement (21 credit units)

• BIOL 120.3
• CHEM 112.3
• CHEM 115.3
• PHYS 115.3
• PHYS 117.3 or PHYS 125.3

Required Cognate Courses

• PHIL 140.3

Choose 3 credit units from the following:

• HLST 110.3
• PSY 120.3
• PSY 121.3
• SOC 111.3
• SOC 112.3

C4 Major Requirement (66 credit units)

• BMIS 340.3 (Intro to Experimental Molecular Biology)
• BMIS 400.0 (Seminar in Biochemistry Microbiology and Immunology)
• BMSC 200.3
• BMSC 207.3 (Human Body Systems I)
• BMSC 208.3 (Human Body Systems II)
• BMSC 210.3
• BMSC 220.3
• BMSC 230.3
• BMSC 240.3
• BMSC 320.3 (Nucleic Acids from Central Dogma to Human Disease)
• CHEM 250.3

Choose 3 credit units from the following:

• BIOC 310.3
• MCIM 390.3
Choose **3 credit units** from the following:

- BINF 200.3
- BINF 210.3

Choose **15 credit units** from the following, including at least 9 credit units at the 400-level:

- BIOC 435.3
- BIOC 405.3
- BIOC 412.3
- BIOC 430.3
- BIOC 436.3
- BMIS 380.3 (Team Based Experimental Microbiology)
- BMIS 308.3 (Intro to Microbial Pathogens)
- BMIS 489.6 (Research Project in Biochemistry Microbiology and Immunology)
- MCIM 321.3
- MCIM 417.3
- MCIM 423.3
- MCIM 425.3
- MCIM 487.3

Choose **15 credit units** from the following:

- ACB 325.3
- ACB 333.3
- BINF 300.3
- BIOL 226.3
- BIOL 316.3
- BIOL 331.3
- BIOL 420.3
- BIOL 436.3
- CHEM 456.3
- FABS 325.3
- FABS 334.3
- FABS 430.3
- FABS 450.3
- PHPY 301.3
- PHPY 302.3
- PHPY 303.3
- SLSC 343.3
- **Any BMSC, BMIS, BIOC or MCIM course at the 300 or 400 level**

**C5 Electives Requirement (15 credit units)**

Arts and Science courses, or those from other Colleges that have been approved for Arts and Science credit, to complete the requirements for 120 credit unit Honours program, of which at least 66 must be at the 200-level or higher.

- **HLST 210.3** is recommended.
Consultation and Correspondence:

Biochemistry, Microbiology, and Immunology

No correspondence specific to this program was received. Please see general information.
Proposal for Academic or Curricular Change

PROPOSAL IDENTIFICATION

Title of proposal: Major in Biomedical Foundations

Degree(s): Bachelor of Science

Field(s) of Specialization: Biomedical Foundations

Level(s) of Concentration: Three-year

Degree College: Arts & Science

Contact person(s) (name, telephone, fax, e-mail):

Dr. Scott Napper
Faculty; Department of Biochemistry, Microbiology, and Immunology; College of Medicine
Scientist and Science Management; Vaccine and Infectious Disease Organization-International Vaccine Research Center
University of Saskatchewan
Tel: (306) 966-1546; e-mail: scott.napper@usask.ca

Dr. Thomas Fisher
Department Head; Department of Anatomy, Physiology, and Pharmacology
College of Medicine
University of Saskatchewan
Tel: (306) 966-6528; e-mail: thomas.fisher@usask.ca

Dr. Bill Roesler
Department Head; Biochemistry, Microbiology, and Immunology
College of Medicine
University of Saskatchewan
Tel: (306) 966-4375; e-mail: bill.roesler@usask.ca

Proposed date of implementation: May 2020
Executive Summary: In 2018, the Departments of Biochemistry and Microbiology & Immunology merged to form the Department of Biochemistry, Microbiology, and Immunology (BMI) and the Departments of Anatomy & Cell Biology, and Physiology and Pharmacology merged to form the Department of Anatomy, Physiology, and Pharmacology (APP). Each of these emerging departments is now updating their undergraduate programs to better reflect their new strengths and priorities. As part of that process, the three-year degrees offered by each of the previous departments (Biochemistry, Microbiology & Immunology, Anatomy & Cell Biology and Physiology & Pharmacology) will be replaced with a single, unified Biomedical Foundations three-year degree that better reflects the high degree of shared course content within the previous degrees and the new structure of the emerging four year degrees which emphasizes multidisciplinary training with a delay of specialization until the fourth year.

Rationale for Program Change:
The biomedical sciences at the University of Saskatchewan are evolving to achieve greater multidisciplinary strength within our departmental structures and academic programs. Given the use of the common two-year platform for all BMSC majors, the extent of specialization that can happen in the third year is limited. It was therefore decided that students would be best served by a single, combined Three-year program option which will have a title that better conveys the broad nature of this major, rather than attempting to offer a Three-year option for each of the specialized majors.

Overall Objectives of the Biomedical Foundations Three-Year Major:

- Provide learners with student-centric, multidisciplinary training.
- Inspire and enable careers within a spectrum of science-based activities.
- Develop skills that will serve them well in the workplace, namely critical thinking skills, communication (written and oral), collaboration and teamwork.
- Provide a strong foundational basis in biomedical sciences and research skills.
- Provide students with experiential learning opportunities.
- Reflect modern priorities in biomedical science education.
- Attract top-tier students, both nationally and internationally.
- Enable enrollment growth for the U of S.

Key Curriculum Changes for the Biomedical Foundations Three-Year Major:
The Biomedical Foundations three-year major retains the common foundations of the existing biomedical science Three-year majors but offers greater choice of courses in the third year. This allows it to serve as a universal option for any student interested in the biomedical sciences. The more general title of this degree, relative to, for example, a three-year degree in Biochemistry, better reflects the breadth, rather than depth, of training the student has received while still having positive connotations.

The Biomedical Foundations three-year degree will represent a shared option for both the BMI and APP Departments with an administrative home within the Dean’s Office of the College of Medicine.

Student Demand for Biomedical Foundations Three-year Degree:
Over the past 5 years, a total average of 29 students per year have graduated with three-year degrees in Biochemistry, Microbiology & Immunology, Anatomy & Cell Biology, and Physiology and Pharmacology. While the change in requirements in 2015 requiring students to complete a four-year degree for application to Medical School at the U of S caused a significant drop in the three-year degrees of the biomedical science programs, the numbers have been quite consistent since that time, and therefore the number of students who pursue the Biomedical Foundations three-year is anticipated to be in this range.
Targeted Demographics of the Biomedical Foundations major:

Graduates with the three-year degrees in the biomedical sciences most typically represent students who gain entry in professional colleges not requiring a four-year degree, such as Pharmacy and Dentistry (see attached support letters). Quite often these students do not wait to delay entry into those programs until they complete the four-year degree but wish to have official acknowledgement of their efforts within an undergraduate program. There are also other students with career objectives requiring some level of post-secondary education outside of the traditional four-year degree. We anticipate a similar composition of students within the Biomedical Sciences Three-year major. Students who enrol in the 3-year degree option will be able to transition easily to a 4-year program if they so choose.

Comparable Programs at the U of S:

In terms of comparable three-year degrees, the closest equivalents at the U of S would likely be Biology and Chemistry. These, however, are very distinct programs with little shared emphasis or course work outside of some common introductory courses.

Comparable Programs in Saskatchewan:

There are no other comparable programs within Saskatchewan. The closest in-province alternative would be at the University of Regina, which offers four year degrees in biology as well as chemistry/biochemistry. In terms of the number of available courses, faculty numbers, research activity, representation of the various biomedical sciences, and available science-based infrastructure, the offerings at the University of Regina are not equivalent with the Biomedical Foundations three-year degree.

Comparable Programs in Canada:

There has been a general decline in the number of Canadian universities offering three-year degrees, in particular within the biomedical sciences. While there may be some exceptions, typically students don’t enter into University programs with the stated goal of a three-year degree. In particular, within the biomedical sciences where many of the opportunities rely on post-graduate training that is dependent upon a four-year degree. Rather these degrees represent a valuable option for students exiting a traditional 4-year program either to enter into a professional college (in particular for the biomedical sciences) or due academic challenges. In either of these situations the three-year degree option represents official recognition of their effort and achievement within the program.

Potential Impacts on Other Academic Programs:

The new Biomedical Foundations three-year degree is not anticipated to have any negative consequences for other academic programs or units, as the majority of the required courses for this major are carried forward from the previous offerings of Biochemistry, Microbiology & Immunology, Anatomy & Cell Biology, and Physiology & Pharmacology. This includes the introductory and related courses taught by other departments, all of which have been consulted about the proposed updates. The Department of Philosophy has been specifically consulted regarding inclusion of PHIL 140.3 (Critical Thinking), and they have offered their support. The Departments of Psychology and History have been consulted regarding inclusion of HLST 110.3 (Introduction to Health Studies) and HIST 165.3 (History Matters: Health and Society), respectively, as recommended electives in the program, and each has offered support for these selections.
Innovation in Academic Programs and Services:

Within the new major there is a priority for multidisciplinary training that is presented within the context of a revamped curriculum that prioritizes innovative lab experiences in cutting-edge technologies and new opportunities for experiential learning. The new program also brings forth innovative approaches to academic services through the development of a number of online courses designed to accommodate students from outside of Saskatoon or with limited access to traditional classes. Currently, BMSC 200.3, BMSC 230.3, and PHYS 208.6 (to become BMSC 207.3/208.3 in 2020-21) are available as online courses with further plans to make other courses of the common BMSC platform available in online formats.

Resources:

No additional financial or personnel resources are required to replace the current three-year degrees with the unified Biomedical Foundations degree offering.
College Statement

From Gordon DesBrisay, Vice Dean Academic

I am pleased to confirm that the College of Arts and Science supports creation of a Bachelor of Science Three-year program in Biomedical Foundations to replace the current Three-year options in Anatomy and Cell Biology; Biochemistry; Microbiology and Immunology; and Physiology and Pharmacology.

The College of Arts and Science is working to provide innovative program options that meet student need and demand. The two-year BMSC platform, which is included in each of the majors in the Biomedical Sciences, results in little room for specialization in only one additional year. The introduction of a Three-year option which allows students to choose breadth, within these defined areas, provides students with the opportunity to explore courses that they are interested in. This program can be laddered into each of the Four-year/Honours majors, but also provides an exit point for students who are admitted to a professional college after three years of study, and for those students whose academic goals change during the process of their degree.

The Academic Programs Committee (BSc) approved the proposal to create the new major on September 17, 2019, as did the College Faculty Council on October 10, 2019.
Program Description

Biomedical Foundations

Through the Dean’s office at the College of Medicine, the biomedical science departments of Biochemistry, Microbiology and Immunology and Anatomy, Physiology, and Pharmacology offer a three-year major in Biomedical Foundations. This major builds on the shared two-year biomedical sciences platform shared by all the biomedical science majors to provide students with a strong foundation of multidisciplinary training while providing flexibility for initial specialization within a particular biomedical science. This program includes necessary courses for students prepared to enter into health-related professional schools not requiring a four-year degree such as Dentistry, Veterinary Medicine and Pharmacy. Graduates are also prepared for careers in broad aspects of biotechnology and they can find employment in academic/research institutions and related industries.

Major Average

The major average in Biomedical Foundations includes the grades earned in:

- All courses listed in the Major Requirement C4.

Residency Requirements in the Major

To receive a degree in Biomedical Foundations, students must complete at least two-thirds of the following coursework (to the nearest highest multiple of 3 credit units) from the University of Saskatchewan.

- Minimum requirements in Major Requirement C4.

See Residency for additional details.
Bachelor of Science Three-year (B.Sc. Three-year) – Biomedical Foundations

No more than 6 credit units from one subject may be used in Requirements C1 to C3.

C1 College Requirement (12 credit units)

English Language Writing

Choose 6 credit units from the following:
- Approved list

Indigenous Learning

Choose 3 credit units from the following:
- Approved list

Quantitative Reasoning

Choose 3 credit units from the following:
- MATH 110.3
- MATH 125.3
- STAT 245.3
- STAT 246.3
- PLSC 214.3

C2 Breadth Requirement (3 credit units)

Choose 3 credit units from the following areas.
- Fine Arts
- Humanities
- Social Sciences
- Courses with No Program Type

C3 Cognate Requirement (21 credit units)

- BIOL 120.3
- CHEM 112.3
- CHEM 115.3
- PHYS 115.3
- PHYS 117.3 or PHYS 125.3

Required Cognate Courses

- PHIL 140.3

Choose 3 credit units from the following:
- HLST 110.3
- PSY 120.3
- PSY 121.3
C4 Major Requirement (42 credit units)

- BMSC 200.3
- BMSC 207.3 (Human Body Systems I)
- BMSC 208.3 (Human Body Systems II)
- BMSC 210.3
- BMSC 220.3
- BMSC 230.3
- BMSC 240.3
- CHEM 250.3

Choose **3 credit units** from the following:

- BIOL 226.3
- BMSC 320.3 (Nucleic Acids from Central Dogma to Human Disease)

Choose **15 credit units** from the following:

- ACB - 300-level, 400-level
- BIOC - 300-level, 400-level
- BMIS - 300-level, 400-level
- BMSC - 300-level
- CPPS - 300-level, 400-level
- MCIM – 300-level, 400-level
- NEUR 301.3 (Fundamental Neuroscience Intercellular Communication)
- NEUR 350.3 (Fundamental Neuroscience)
- NEUR 405.3 (Topics in Neuroscience)
- PHPY - 300-level, 400-level

C5 Electives Requirement (12 credit units)

Arts and Science courses, or those from other Colleges that have been approved for Arts and Science credit, to complete the requirements for 90 credit unit Three-year program, of which at least 42 must be at the 200-level or higher.
MEMORANDUM

TO: Planning and Priorities Committee of Council
FROM: Dr. Ed Krol, Acting Associate Dean, Academic
DATE: July 2, 2019
RE: New Biomedical Sciences Undergraduate Program

This memo is to indicate support for the new collaborative Biomedical Sciences (BMSC) undergraduate program to be jointly offered by the Colleges of Medicine and Arts and Science.

Currently, there are courses offered through the respective departments in the College of Medicine (Anatomy, Physiology and Pharmacology [APP] and Biochemistry, Microbiology and Immunology [BMI]) that are required prerequisites for admission to the pharmacy program. In addition, the Nutrition program has several required courses in the current curriculum also delivered through APP and BMI.

As a non-direct entry college, we always advise students to seek out different options to complete another degree in the event they are not admitted to either the pharmacy or nutrition program. Offering a new collaborative undergraduate BMSC program would provide a worthwhile option to those particular students.

If you require further information, do not hesitate to contact me at ed.krol@usask.ca or phone 966-2011.

Sincerely,

Ed Krol, Ph.D.
Acting Associate Dean, Academic
Hello Dawn,

The College of Dentistry is happy to support your proposed 3-year degree proposal. Students applying to the DMD program require 3 years of a full-course load and not a 4-year degree so the 3- year degree program will not affect their eligibility provided they complete all of the pre-requisites.

Good luck with the proposal.

Kind Regards, Kelly

Kelly Mulligan

Director of Academic & Student Affairs

College of Dentistry

Ph. (306) 966-2760
Biomedical Sciences Program Proposals – General Information

The course requirements for the BMSC Platform have been selected to provide students with a broad base of multi-disciplinary biomedical science training within the first two years. These requirements include:

- English Language Writing requirement – 6 credit units
- Indigenous Learning Requirement – 3 credit units
- Quantitative Reasoning Requirement – 6 credit units (3 credit units for the B.Sc. Three-year) from:
  - MATH 110.3
  - MATH 125.3
  - STAT 245.3
  - STAT 246.3
  - PLSC 214.3

At least 3 credit units from:

- HLST 110.3
- PSY 120.3
- PSY 121.3
- SOC 111.3
- SOC 112.3

Required courses:

- BIOL 120.3
- BMSC 200.3
- BMSC 207.3 (Human Body Systems I)
- BMSC 208.3 (Human Body Systems II)
- BMSC 210.3
- BMSC 220.3
- BMSC 230.3
- BMSC 240.3
- CHEM 112.3
- CHEM 115.3
- CHEM 250.3
- PHIL 140.3
- PHYS 115.3
- PHYS 117.3 or PHYS 125.3

The existing Biomedical Sciences (BMSC) platform was designed to enable informed decisions about selection of majors while also facilitating transition into other majors both within, and outside of, the biomedical sciences. This common platform includes introductory courses within a spectrum of basic science and biomedical science disciplines which provides a foundation from which students can select their major. In the proposals submitted for approval, the platform has been improved through the addition of a required course in Critical Thinking (PHIL 140.3), to expose students to this area of study, and to ensure that graduates are better problem solvers. The option to take courses in Health Studies (HLST 110.3, HLST 210.3) has also been highlighted, an area of study which shares a similar priority, by wider perspective, as the biomedical science majors. Including these courses provides future biomedical
science majors with a solid foundation, but also offers, especially after the first year, flexibility to choose a different academic direction. Rather than competing, we want students to have as much exposure as possible to each program to make informed decisions about which best serves their interests and aptitudes.

The proposed majors are built on the recently-updated Arts and Science B.Sc. template, which includes an Indigenous Learning requirement. We feel that this change will help to ensure graduates are better prepared to understand the world around them and make better decisions as citizens and scientists.

There are a number of courses taught by the biomedical science departments which are required by other academic programs. There will be no change in the offerings of these courses nor their availability to students outside the BMSC programs.

We do not initially expect overall changes in demand for the proposed majors relative to the current majors, but growth is expected over time. However, any significant increase in enrollment would have the potential to stress the registration limits of foundational science courses such as BIOL 120.3 and CHEM 112.3. These courses currently represent a critical bottleneck to the expansion of a number of academic programs on campus. The colleges and departments, as well as the Provost, are well aware of these issues, and are seeking solutions.

**Transition of existing students:**

Students will be given the option to change to the new program starting September 2020, or will be allowed to complete the old program as per A&S policy.

**Transition and timing of new courses:**

New/merged courses will be offered starting in the 2020/21 school year. Appropriate course equivalency will be considered for students who for one reason or another are returning to complete their studies after a period of absence, on a case by case basis.
Consultations:

Extensive consultation with all stakeholders was undertaken. All departments that are involved in teaching in the BMSC program have been consulted. Changes to the proposal were made in response to the many discussions.

College of Medicine
- Dr. Preston Smith, Dean, College of Medicine
- Dr. Thomas Fisher, Department Head, Department of Anatomy, Physiology, and Pharmacology
- Dr. Bill Roesler, Department Head, Department of Biochemistry, Microbiology and Immunology
- Dr. Fergall Magee, Department Head, Pathology and Laboratory Medicine
- Dr. Anne Leis, Department Head, Community Health and Epidemiology
- College of Medicine Faculty Council

College of Arts and Science
- Dr. Peta Bonham-Smith, Dean
- Dr. Gordon DesBrisay, Vice Dean Academic
- Dr. P. Alward, Department Head, Philosophy
- Dr. G. Sarty, Department Head, Psychology
- Dr. M. Mickleborough, Director, Health Studies Program
- Dr. Ken Wilson, Department Head, Biology
- Dr. Matthew Paige, Department Head, Chemistry
- Dr. Sasha Koustov, Department Head, Physics
- Dr. Erika Dyck, Faculty Member, History

College of Dentistry
- Dr. Gerry Uswak, Acting Associate Dean, Academic
- Kelly Mulligan, Director of Academic and Student Affairs

College of Kinesiology
- Dr. Kent Kowalski, Associate Dean, Academic

College of Pharmacy and Nutrition
- Dr. Ed Krol, Acting Associate Dean, Academic

Student groups in BMSC
- ACBC: Anatomy and Cell Biology Club
- MISA: Microbiology and Immunology Students’ Association
- BSA: Biochemistry Students’ Association
- PHPY: Physiology and Pharmacology Students’ Association
Planning and Priorities Committee
NOTICE OF INTENT for new Biomedical Sciences Undergraduate Program

1. **Motivation**: On July 1, 2018, the five Biomedical Sciences (BMSC) departments (Biochemistry, Microbiology & Immunology, Anatomy & Cell Biology, Physiology, and Pharmacology) in the College of Medicine (COM) merged to form two departments; Anatomy, Physiology and Pharmacology (APP) and Biochemistry, Microbiology and Immunology (BMI). With these mergers complete, it is time to update the undergraduate (UG) majors to match the new Departmental structures and priorities.

The COM has been working closely with the College of Arts and Science (A&S) to create a new collaborative BMSC Program to be jointly offered by both colleges. We are proposing to achieve this using a two-phase process carried out over two years. The first phase will involve the creation of three new majors to replace the four current majors of Biochemistry; Microbiology and Immunology; Anatomy and Cell Biology; and Physiology and Pharmacology. The new majors are Biochemistry, Microbiology and Immunology (BMI); Cellular, Physiological, and Pharmacological Sciences (Name TBD at April APP meeting) and Neurosciences (NEUR). The second phase will involve the creation of the new collaborative program to be offered by the COM and A&S which will result in a BSc. (BMSC). We will create a new Type M template and a new admissions process enabling both direct entry from high school as well as delayed entry from other University programs. The rationale for a two-phase process follows.

The College of Arts and Science is currently undergoing curriculum renewal process which is resulting in a change to the templates used to define their degrees. The templates come into effect for the 2020-2021 school year and as such, we will create our replacement majors to fit the new Type C template.

In **phase one** we will replace the four current BMSC majors with three new majors. These efforts will include the merging of select courses to reduce redundancy of content as well as adding new courses to enhance the student learning experience. For example, this will include the introduction of Course Based Undergraduate Research Experience (CURE) courses to introduce an experiential learning component. These changes will make more efficient use of current resources to deliver quality programs to students.

In **phase two**, the new BMSC Program will be implemented with further improvements to admissions, curriculum, governance, and student support. With respect to admissions, this program will be shared by both the COM and A&S and will have a new admission stream. A new Type M degree template will be created which will allow students to apply directly to the BMSC UG program right out of high school. Further changes to the curriculum will involve the creation of an Interdisciplinary BMSC major with the introduction of additional courses (Epidemiology and Pathology). We will create BMSC learning
communities for students with COM faculty involvement. In terms of changes to governance, we are proposing to create a new BMSC APC committee, populated by both A&S and COM faculty, that will have responsibility for changes to BMSC courses and major requirements. The program will stay in A&S which will help to reduce any duplication of services by keeping student services in A&S. We expect that phase two can be approved at all appropriate levels of the university (Academic Programs Committee of Council, Council, Senate and Board of Governors) in time to allow the new program to start in Sept 2021.

2. Student demand: Within the first phase of the changes we expect student demand for the replacement majors to remain consistent with current levels. On average, about 320 students enter the second year of the program with about 800 students total in years 2-4 of the BMSC program. These numbers have remained fairly steady for the last 6 years. With the launch of the new admission stream, we anticipate that the program, and the marketability of the program being linked to the COM, will cause an increase in student enrollment.

3. Fit with college/university plans: The proposed BMSC UG program is specifically highlighted in the area of Strengthening Research Capacity in the COM strategic plan. Our goal is to implement a strong biomedical science program that stimulates graduate student and faculty research programs. In addition, the undergraduate program will work to encourage and expand collaborations – both interdisciplinary and college basic science/clinical. In particular, we are collaborating with the departments of Community Health and Epidemiology and Pathology to offer new undergraduate courses in Epidemiology and Pathology.

The COM is extremely proud of its proactive efforts to encourage Indigenous students towards careers in Medicine. Specifically, our Medical School initiated a number of ground-breaking programs and admissions processes that have been extremely successful in recruitment and retention of Indigenous students. There will be shared priorities and mechanisms to attract Indigenous students to the BMSC Program. These efforts can serve as a starting foundation for larger-scale, focused recruitment efforts that will include an inter-provincial effort to increase Indigenous student awareness of the program, as well as to leverage existing relationships between the COM and our affiliated Northern schools. The BMSC Program will also implement measures that allow us to quantify Indigenous enrolment within the program through self-declared Aboriginal status. Finally, courses in Indigenous Learning will represent required components of all of the BMSC degrees.

4. Relationships to other programs: The new BMSC undergraduate program will ultimately replace the current BMSC degree options. In phase one, the four current majors in Biochemistry; Microbiology and Immunology; Anatomy and Cell Biology; and Physiology and Pharmacology will be replaced by the three majors of Biochemistry, Microbiology and Immunology; Cellular, Physiological, and
Pharmacological Sciences; and Neuroscience. In phase two, the Biomedical Sciences Interdisciplinary major will be added. We do not anticipate any impact to other programs on campus or elsewhere.

The Health Studies major offered through the College of Arts and Sciences is the closest comparable program at the U of S. Similar to the BMSC program, many students of the Health Studies program aspire to go into Medical School, or into other health science professions. There is also some course overlap, in particular within the first two years. The programs are, however, quite distinct in their upper year requirements where the BMSC Program places heavy emphasis on biomedical science courses, within each of the majors. In contrast, the Health Studies Program strives for a more holistic perspective with a much broader interdisciplinary scope. Indeed, the Health Studies major is a Bachelor of Arts and Science program, self-described as “a distinct interdisciplinary undergraduate program that builds on and combines science, social sciences, and humanities/fine arts.” The expanded scope of this program (relative to the BMSC Program) is achieved through a reduced requirement for science courses, balanced by an increased requirement for arts courses. As such, the Health Studies and BMSC offerings represent quite distinct educational experiences largely catering to unique populations of students. Notably, we have been in active discussion with the leaders of the Health Studies program and they have offered their support and enthusiasm for the development of the BMSC Program and the synergies this will offer with their own program.

There are no other comparable programs within Saskatchewan. The closest in-province alternative would be at the University of Regina, which offers degrees in Biology as well as Chemistry/Biochemistry. In terms of the number of available courses, faculty numbers and research activity, representation of the various biomedical sciences, and available science-based infrastructure, the programs at the University of Regina are not comparable to the current, or proposed, Biomedical Science programs at the U of S.

Many Canadian Universities, in particular those with Medical Schools, offer degrees within the biomedical sciences. Further, many Canadian Universities have moved towards a multidisciplinary approach to biomedical science education including majors in “Interdisciplinary Biomedical Sciences”. Several Canadian Universities have already adopted biomedical science structures which are similar to the program proposed here. These models show a shared priority for multidisciplinary training, although not to the exclusion of specialized majors in specific biomedical science disciplines, including the introduction of Interdisciplinary Biomedical Science or Interdisciplinary Medical Science degrees that are similar in scope and philosophy to the current proposal. Within the Canadian Medical Universities there are examples of such programs being offered through either Arts and Science, Medical Colleges, or shared models. The BMSC program is essential for us to compete with these schools, both for retention of local students as well as to attract students on national and international scales. In particular, there is the opportunity to differentiate our program and our campus by virtue of the existing infrastructure strengths, including the Canadian Light Source (CLS), the Vaccine and Infectious Disease Organization-International Vaccine Centre (VIDO-InterVac) and the new Health Sciences building.
4. **Resources available:** No additional resources will be required to implement this change. We will be deleting the current majors offered by the previous BMSC departments, replacing them with the new majors and using our current resources to support the new majors. By keeping the program in A&S we are leveraging their existing infrastructure and expertise for student support and program administration (student advising and promotion, and graduation procedures). This will avoid the need to duplicate these services in the COM.

The Provost, Vice-Provost, Teaching and Learning, Institutional Planning and Assessment, and the Registrar’s Office have been consulted at every step in the planning for the new BMSC program.

5. **Risks, assumptions, or constraints:** We do not believe that there are any risks associated with this new program proposal.

6. **Start date:** The start of the three replacement majors in BMSC will coincide with the start of the new curriculum in A&S in Sept 2020 (phase one). The anticipated start date of the new BMSC interdisciplinary major with new admissions stream (phase two), will be September 2021.
April 18, 2019

To: Planning and Priorities Committee of Council

Re: College of Medicine Letter of Support for the Notice of Intent for the New Biomedical Sciences Undergraduate Program

This is a letter of support confirming the College of Medicine’s endorsement of the new collaborative Biomedical Sciences (BMSC) undergraduate program to be jointly offered by the Colleges of Medicine and Arts and Science. This is the initial phase of re-aligning our programs to reflect the new departmental structures that came into effect in July 2018.

The College of Medicine, in cooperation with the College of Arts and Science, has been working hard to build a truly collaborative undergraduate program. We have consulted extensively with BMSC faculty and students to build on our current program. This has led us to create an innovative program with renewed priority on critical thinking, multidisciplinary training, and experiential learning. In addition, we are excited to be partnering with clinical departments to offer new pathology and epidemiology courses. We are confident that this new program will enhance the teaching and research missions of the College.

Our BMSC program has a vision that will see an increase in the numbers and quality of students coming into our program, and to increase the graduates to health professional programs and graduate studies. We want to support the culture and identity of our faculty and their affiliation with the programs and the students they teach, and ensure sustainable and viable programs.

Living by the principles and priorities of the university, our college is committed to working in collaboration with the College of Arts and Science to establish a joint Biomedical Sciences undergraduate degree with four majors.

Kind regards,

Preston Smith
Dean
TO: Dr. Dirk de Boer, chair, Planning and Priorities Committee of Council

FROM: Dr. Gordon DesBrisay, Vice-Dean Academic, College of Arts and Science

DATE: April 18, 2019

RE: NOI for New Biomedical Sciences Undergraduate Program (BMSC)

On behalf of the College of Arts and Science, I am pleased to offer our full support for the proposed new Biomedical Sciences Undergraduate Program (BMSC).

When an earlier NOI for this program was submitted to Planning and Priorities in February 2017, Arts and Science offered support in principle while also raising a number of concerns. I am pleased to report that those concerns have all been addressed.

The NOI is beautifully constructed and very clear, so I will only add that the academic programming changes categorized as “phase one” are relatively unchanged from the 2017 NOI, and we continue to welcome and approve of them. The structural changes mapped out as “phase two” are new to this NOI and constitute a significant step forward that addresses all of the key issues our college had. In particular, as noted in the NOI, keeping the program in Arts and Science eliminates the main TABBS complications that loomed over the earlier proposal and avoids a wasteful duplication of services.

In offering unqualified support for this initiative, I must also extend warm thanks to our colleagues in the College of Medicine who have consulted with us and been model partners at every stage of the lengthy and ongoing conversations on which this NOI rests.

Yours sincerely,

Gordon DesBrisay
MEMORANDUM

TO: Preston Smith, Dean, College of Medicine; Gordon Desbrisay; Vice-Dean Academic, College of Arts and Science; Scott Napper, College of Medicine; Dawn Giesbrecht, College of Medicine; Alexis Dahl, College of Arts and Science

FROM: Dirk de Boer, chair, planning and priorities committee of Council

DATE: May 10, 2019

RE: Notice of Intent - Biomedical Sciences undergraduate programs

Thank you for attending the Planning and Priorities Committee meeting of April 24, 2019 to discuss the notice of intent for the new biomedical sciences undergraduate programs.

The committee is supportive of the collaborative nature of the programs, and is excited about the direct-entry model proposed, as well as of the introduction of a major in neuroscience, given our disciplinary strengths. Even so, there are a few concerns that the committee would like the Colleges of Arts & Science and Medicine to consider as they continue to develop the proposals for these academic programs.

The committee raised concerns about how these programs will be funded. The Provost particularly expressed concern that the College of Arts & Science could be negatively impacted by a joint delivery model, given the different funding models in place for each college. He noted that the complexities of SUFM will make budgeting for programs jointly delivered with the College of Medicine very challenging. The committee wants to see the proponents take the time required to really consider the funding impacts of the joint nature of these programs.

The committee also raised concerns about the names of the programs, noting that they are not likely to be intelligible or relatable for their intended audiences, that is high school students selecting a major. The committee would like to see some thought go into the names of the programs to ensure they resonate with the intended audience.
Concerns were also raised about the level of consultation with other units and departments within the College of Arts & Science about the teaching requirements of these programs and the committee would like to see better and broader consultation.

Finally, the committee felt that with a variety of health-focused undergraduate programs, work needs to be done on differentiating the programs and on ensuring that prospective students are aware of the various options, how they are different, and the potential pathways that the different programs open up. Relatedly, the committee also expressed a desire to see it made easy for students to transfer from one program to another if they find their skills and interests change.

Please do not hesitate to contact me if you have any questions.

Kind regards,

Dirk de Boer

c. Tony Vannelli, provost and vice-president academic
   Beth Bilson, university secretary
   Russell Isinger, registrar
Consultation:

BMSC programs (general)

On 7/15/2019 1:37 PM, Napper, Scott wrote:
Hi Ken,
Thanks again for meeting with us last week to discuss the proposed new majors of the biomedical science departments.

As discussed, BIOL226.3 is now required for both the Neuroscience and CPPS majors as well as being an elective for the BMI major. Additionally, BIOL430 has been added as an elective for the Neuroscience major. We are committed to exploring other ways that Biology could contribute to the Neuroscience major.

The updated course requirements for each major are attached.

We also welcome further conversations on the development of a Genetics certificate, as well as exploration of other potential synergies.

I am optimistic for a new and strengthened relationship with Biology as we move towards the launch of the shared BMSC Program in 2021.

All the best,
Scott

Dr. Scott Napper
Professor, College of Medicine, Department of Biochemistry, Microbiology & Immunology
Senior Research Scientist, Vaccine and Infectious Disease Organization-International Vaccine Research Centre
University of Saskatchewan
(306) 966-1546

From: Wilson, Ken <ken.wilson@usask.ca>
Sent: Monday, July 15, 2019 3:43 PM
To: Napper, Scott <scott.napper@usask.ca>
Cc: Dahl, Alexis <alexis.dahl@usask.ca>
Subject: Re: Follow-up on biomedical science majors discussion

Thanks Scott

I agree, I think that there are a lot of ways for us to work together both with the launch of BMSC in 2021, but I think your units’ courses can help us broaden the appeal of Biology for students, as well. We just need to work on building some mutual understanding
Greetings Dr. Paige,
I am contacting you in my role as Lead in the evolution of the undergraduate biomedical science programs within the College of Medicine.

As you may be aware, in July 2018 the biomedical sciences departments restructured with Biochemistry merging with Microbiology & Immunology to form Biochemistry, Microbiology, & Immunology (BMI) and Anatomy & Cell Biology merging with Physiology & Pharmacology to form Anatomy, Physiology & Pharmacology (APP).

The new departments are now looking to change their majors to reflect the new departmental structures.

The current Biochemistry and Microbiology & Immunology majors will be replaced with a unified Biochemistry, Microbiology, & Immunology (BMI) major.

The Anatomy & Cell Biology and Physiology & Pharmacology majors will be replaced with majors in Neuroscience as well as Cellular, Physiological, Pharmacological Sciences (CPPS).

The course requirements for the new majors are outlined in the attached documents. There are no changes to Chemistry requirements of the new majors. Students will still require CHEM112, CHEM115, and CHEM250. As such, we don't anticipate that these changes will have significant impact on your courses.

We hope to receive your support, and ongoing access to these courses, for this exciting change with our program.

From: Napper, Scott <scott.napper@usask.ca>
Sent: Monday, July 15, 2019 1:50 PM
To: Paige, Matthew <matthew.paige@usask.ca>
Cc: Dahl, Alexis <alexis.dahl@usask.ca>
Subject: Changes to Biomedical Science Majors
Please let me know if you would like to meet to discuss this further.

All the best,
Scott

Dr. Scott Napper
Professor, College of Medicine, Department of Biochemistry, Microbiology & Immunology
Senior Research Scientist, Vaccine and Infectious Disease Organization-International Vaccine Research Centre
University of Saskatchewan
(306) 966-1546

From: Paige, Matthew <matthew.paige@usask.ca>
Sent: Monday, July 15, 2019 4:19 PM
To: Napper, Scott <scott.napper@usask.ca>
Cc: Kelly, Timothy <tim.kelly@usask.ca>; Dahl, Alexis <alexis.dahl@usask.ca>
Subject: FW: Changes to Biomedical Science Majors

Dear Scott,

Thanks for the email and I’m excited to hear about your new program.

I’ve CC’d Tim Kelly, the chemistry Department’s undergraduate affairs chair, on this message. He’s the primary contact person on undergraduate program issues and he’ll be in touch if there are any issues that come up. We’re happy to ensure continued access to chemistry courses as needed. As you say, it doesn’t look like there will be much impact from our point of view, but Tim will be in touch if there are any concerns.

Best regards,

- Matt.

Matthew Paige
Thorvaldson Professor and Department Head
Department of Chemistry
Thorvaldson 261
University of Saskatchewan
Phone: 1-306-966-4665

From: Paige, Matthew <matthew.paige@usask.ca>
Sent: Monday, July 15, 2019 4:19 PM
To: Napper, Scott <scott.napper@usask.ca>
Cc: Kelly, Timothy <tim.kelly@usask.ca>; Dahl, Alexis <alexis.dahl@usask.ca>
Subject: FW: Changes to Biomedical Science Majors
Dear Scott,

Thanks for the email and I'm excited to hear about your new program.

I've CC:'d Tim Kelly, the chemistry Department’s undergraduate affairs chair, on this message. He’s the primary contact person on undergraduate program issues and he’ll be in touch if there are any issues that come up. We’re happy to ensure continued access to chemistry courses as needed. As you say, it doesn’t look like there will be much impact from our point of view, but Tim will be in touch if there are any concerns.

Best regards,

- Matt.

=============  
Matthew Paige  
Thorvaldson Professor and Department Head  
Department of Chemistry  
Thorvaldson 261  
University of Saskatchewan  
Phone: 1-306-966-4665

From: Napper, Scott <scott.napper@usask.ca>  
Sent: Monday, July 15, 2019 1:50 PM  
To: Paige, Matthew <matthew.paige@usask.ca>  
Cc: Dahl, Alexis <alexis.dahl@usask.ca>  
Subject: Changes to Biomedical Science Majors

Greetings Dr. Paige,

I am contacting you in my role as Lead in the evolution of the undergraduate biomedical science programs within the College of Medicine.

As you may be aware, in July 2018 the biomedical sciences departments restructured with Biochemistry merging with Microbiology & Immunology to form Biochemistry, Microbiology, & Immunology (BMI) and Anatomy & Cell Biology merging with Physiology & Pharmacology to form Anatomy, Physiology & Pharmacology (APP).

The new departments are now looking to change their majors to reflect the new departmental structures.

The current Biochemistry and Microbiology & Immunology majors will be replaced with a unified Biochemistry, Microbiology, & Immunology (BMI) major.

The Anatomy & Cell Biology and Physiology & Pharmacology majors will be replaced with majors in Neuroscience as well as Cellular, Physiological, Pharmacological Sciences (CPPS).
The course requirements for the new majors are outlined in the attached documents. *There are no changes to Chemistry requirements of the new majors.* Students will still require CHEM112, CHEM115, and CHEM250. As such, we don't anticipate that these changes will have significant impact on your courses.

We hope to receive your support, and ongoing access to these courses, for this exciting change with our program.

Please let me know if you would like to meet to discuss this further.

All the best,
Scott

Dr. Scott Napper
Professor, College of Medicine, Department of Biochemistry, Microbiology & Immunology
Senior Research Scientist, Vaccine and Infectious Disease Organization-International Vaccine Research Centre
University of Saskatchewan
(306) 966-1546

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From: Napper, Scott <scott.napper@usask.ca>
Sent: Monday, July 15, 2019 1:57 PM
To: Koustov, Alexandre <sasha.koustov@usask.ca>
Cc: Dahl, Alexis <alexis.dahl@usask.ca>
Subject: Changes to Biomedical Science Majors

Greetings Dr. Koustov,
I am contacting you in my role as Lead in the evolution of the undergraduate biomedical science programs within the College of Medicine.

As you may be aware, in July 2018 the biomedical sciences departments restructured with Biochemistry merging with Microbiology & Immunology to form Biochemistry, Microbiology, & Immunology (BMI) and Anatomy & Cell Biology merging with Physiology & Pharmacology to form Anatomy, Physiology & Pharmacology (APP).

The new departments are now looking to change their majors to reflect the new departmental structures.

The current Biochemistry and Microbiology & Immunology majors will be replaced with a unified Biochemistry, Microbiology, & Immunology (BMI) major.

The Anatomy & Cell Biology and Physiology & Pharmacology majors will be replaced with majors in Neuroscience as well as Cellular, Physiological, Pharmacological Sciences (CPPS).
The course requirements for the new majors are outlined in the attached documents. *There are no changes to Physics requirements of the new majors.* Students will still require 6 cu of physics with PHYS115.3 being required and further option between PHYS117.3 and PHYS125.3. As such, we don't anticipate that these changes will have significant impact on your courses.

We hope to receive your support, and ongoing access to these courses, for this exciting change with our program.

Please let me know if you would like to meet to discuss this further.

All the best,
Scott

Dr. Scott Napper  
Professor, College of Medicine, Department of Biochemistry, Microbiology & Immunology  
Senior Research Scientist, Vaccine and Infectious Disease Organization-International Vaccine Research Centre  
University of Saskatchewan  
(306) 966-1546